APPLYING REGULATORY FIT TO MEMORY CONFIDENCE: A TEST OF THE REGULATORY FIT FRAMEWORK

A Dissertation

by

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ABSTRACT

Regulatory fit effects have been hypothesized to be caused by a "feeling of rightness." I applied the regulatory fit framework to the novel area of memory confidence in a test of the proposed feeling of rightness mechanism. I accomplished this by manipulating regulatory fit using a median split on the Regulatory Focus Questionnaire and randomly assigning participants to a task reward structure (gains or losses). Participants completed a standard recognition memory test and rated their confidence in their memory judgments. I examined how regulatory fit affects confidence in accurate memories and false memories. I explored whether regulatory fit affects another measure of memory confidence, that of global predictions and post-dictions of memory performance. I also examined whether methodology impacted regulatory fit effects.

Results indicated that regulatory fit did not affect confidence in accurate memories or false memories, memory performance, or global predictions or second-order judgments. Regulatory fit did affect global post-dictions. Memory confidence methodology did not alter any effects.

DEDICATION

I would like to dedicate this dissertation to everyone mired in nihilism and without a sense of meaning in life. It seems that meaning can emerge as a consequence of action rather than meaning necessarily having to precede action.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

"The only way to get rid of temptation is to yield to it. Resist it, and your soul grows sick with longing for the things it has forbidden to itself…" (Wilde, 2006). Pleasure and pain serve important roles in directing human behavior. The hedonic principle, which states that people approach pleasure and avoid pain, has been used by behavioral scientists to understand behavior for decades (e.g. Kahneman & Tversky, 1979; Gray, 1982; Thorndike, 1935; Festinger, 1962). However, the hedonic principle does not specify different ways of approaching a desired end-state, nor does it distinguish between the consequences of approaching different kinds of stimuli, such as approaching reward versus approaching non-punishment (Higgins, 1997).

Higgins proposed the regulatory focus framework as a more detailed motivational theory. He intended this framework to more fully describe the operation of the hedonic principle when it is satisfying distinctly different needs. In the first years of life, human beings rely on their caretakers to satisfy their needs for security and nurturance (Bowlby, 1969, 1973), but to satisfy these needs children must develop a relationship with their caregiver. Caregivers' responses to children are governed by a set of psychological rules. Children's behavior will directly influence how their caregivers react. It is within this relational context that children first learn *how* to satisfy their needs (Higgins, 1997), and the hedonic principle acts as an indicator as to when a need has or has not been met.

Children develop two specific forms of self-regulation (promotion and prevention focus) in these child-caregiver exchanges. Promotion is derived from satisfying the hedonic principle with respect to needs for nurturance. For example, when children are praised for engaging in some appropriate behavior they experience pleasure at the arrival of a positive, nurturing

outcome, but they feel pain associated with the removal and subsequent absence of a positive outcome if, for example, caregivers end play time early because children are acting too aggressively towards others. The above examples deal with the presence and absence of *positive* outcomes related to nurturing behaviors (see Higgins, 1997 for more detail). Children, in effect, learn that the hopes and aspirations caregivers have for them are important.

Children also learn about self-regulation with respect to safety, that is they learn to acquire a prevention focus. They feel pleasure due to the absence of a negative outcome when they are, for example, taught about "stranger danger," but feel pain due to the arrival of a negative outcome when they are spanked for getting in a fight at school. In these examples, *negative* outcomes related to safety behaviors determine whether children experience pleasure or pain. Caregivers communicate that what they believe children *ought* to do is important. Ultimately, children develop promotion and prevention-focused methods of self-regulation that categorize goals as hopes and aspirations (promotion) or duties and obligations (prevention) (Higgins & Silberman, 1998). To state it more clearly, the idea is that individuals who have a primary promotion focus are concerned with nurturance, so they view goals as accomplishments and are primarily sensitive to the presence and absence of positive outcomes when in a promotion focus. In contrast, individuals who have a prevention focus are concerned with safety and view goals as duties and obligations while being sensitive to the presence or absence of negative outcomes (see Higgins, 1997; 1998 for discussion).

Because individuals in a promotion or prevention focus view goals differently due to their concern with either nurturance or safety, they adopt different strategies to attain their goals (Higgins, 1997). Individuals may have the goal of squatting twice their bodyweight for 5 reps, but primarily promotion-oriented individuals will view this goal differently than primarily

prevention-oriented individuals. Promotion-oriented people will view a twice bodyweight squat as an accomplishment and seek out experiences and opportunities that will help them achieve this desirable end state such as eating as much protein as possible or squatting three times a week instead of only once. Prevention-oriented people will view this goal as a duty and adopt a different approach. Rather than seeking out new means to achieve this end state, they will instead focus on preventing obstacles from impeding their progress towards it. These individuals might take the advice of Mark Rippetoe who once stated "You don't get big and strong from lifting weights, you get big and strong from *recovering* from lifting weights." (Rippetoe, 2011) As such, they may try to avoid training too frequently or drinking too much alcohol as both would interfere with recovery (see Cesario, Grant, & Higgins, 2004 for another example). Promotion-focused individuals are said to use *eager means* to reach a desired end state and prevention-focused individuals are said to use *vigilant means* to avoid an undesired end state (that of not being able to squat twice their bodyweight) (Higgins, 1997).

Origins of Regulatory Focus and Regulatory Fit

Regulatory focus, and later regulatory fit, arose from Higgins self-discrepancy theory (Higgins 1987; 1989; Higgins, Klein and Strauman 1985). Self-discrepancy theory states that individuals guide their behavior towards two types of goals: ideals and oughts. Ideals are much like a promotion focus. These are hopes and aspirations that individuals may have for themselves or for someone else. Oughts are much like a prevention focus. This is when individuals attempt to guide their behavior in terms of what they believe they should do. Higgins calls oughts and ideals *self-guides*. Part of self-discrepancy is the idea that individuals monitor their current actual self and how this corresponds to the desires of their self-guided states.

Individuals may monitor their own behavior, but in the case of parents and organizations, individuals may also monitor other people's behavior.

According to self-discrepancy theory, people compare their self-guides to their actual selves because they desire to have their actual self match the goal of their self-guide. When individuals' actual self attributes match the attributes derived from that of a particular self-guide, this leads to specific psychological consequences. When individuals' actual self attributes are discrepant from those derived from a self-guide this leads to different psychological consequences. For example, when individuals notice that their actual self is discrepant from their self-guide they are motivated to change their actual self. When the actual self is congruent with their self-guide, individuals know that they are doing well.

As we will discuss later with respect to regulatory fit, Higgins postulated and demonstrated that individuals are sensitive to different types of outcomes when under a different self-guide (Higgins 1987; 1989; Higgins, Klein and Strauman 1985). In one study, Higgins and colleagues measured self-discrepancies and correlated these with measures of negative emotional constructs. An early method of measuring these self-guides was by examining actual:ideal discrepancy and actual:ought discrepancy (Higgins & Tykocinski, 1992; Higgins, Klein, & Strauman, 1985). These measures of the strength of these guides asked participants to list attributes that they thought they actually were, attributes they would ideally like to have, and the attributes that they thought they ought to embody. The researchers would then examine these three lists for synonyms and antonyms. The strength of a self-discrepancy was calculated by adding up the total number of matches and mismatches and then subtracting the number of matches from the number of mismatches.

In the early study examining the relationship between emotional variables and self-discrepancies, Higgins and colleagues asked participants to list their actual, ideal, and ought self-attributes followed by measures of emotion such as the Emotions Questionnaire and measures of depression such as the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the Blatt Depressive Experiences Questionnaire (Blatt, D'Afflitti, & Quinlan, 1976). Higgins and colleagues analyzed this data by correlating the strength of individuals' self-discrepancies and the scales and subscales of all the preceding questionnaires. The researchers made several predictions. First, they predicted that the larger a discrepancy is between the actual and ideal selves, the more people would report feelings of disappointment and dissatisfaction. They also predicted that the larger a discrepancy was between actual and ought selves the more people would report feelings of guilt, self-contempt, and agitation.

It is worth noting why these two types of self-discrepancies should lead to different kinds of negative emotions. Higgins simply states, with little explanation, that these two predictions are part of self-discrepancy theory. However, there is also some evidence from previous studies on different topics that suggests these predictions are valid. A previous study reported results that showed individuals become dissatisfied when they focus on the discrepancies between their actual self and their ideal self (Duval & Wicklund, 1972). Other studies also suggest that individuals may experience guilt, fear, and anxiety when there is a discrepancy between their actual behavior and what they should do (e.g. Scheier & Carver, 1983; Sullivan, 1953; Ausubel, 1955; Piers & Singer, 1971).

Higgins and colleagues' predictions were borne out. Actual versus ideal self-discrepancy was associated with feelings of disappointment, anhedonia, and not feeling effective. It was also associated with the introjection subscale, which measures whether people feel like they have not

met their own ideal standards. Actual vs. ought self-discrepancy was associated with feelings of worthlessness and uniquely associated with feelings of guilt. The association with guilt was in the opposite direction of that which was predicted. That is, the more discrepant an individual was between their actual and ought self the less they reported feeling guilty. This may be because individuals tend to deny feeling guilty when they have committed some kind of transgression (see Horney 1939; Cameron, 1963). This evidence would indicate that individuals responded differently to the two different kinds of discrepancies. An ideal self-discrepancy is associated with feeling dissatisfied, whereas an ought self-discrepancy is associated with feeling worthless. Other studies have examined the relationship between self-discrepancies and cognition.

An early study examining cognition and self-discrepancy strengths demonstrated that participants remember information better when that information consisted of positive outcomes and the individuals reading that information possessed a stronger actual:ideal discrepancy (Higgins & Tykocinski, 1992). Higgins and Tykocinski measured the strength of self-discrepancy and asked participants to read some text passages describing 20 events from a fictional person's life. Afterwards, participants were given a memory test for the events themselves. The events in the passages varied on two dimensions. As mentioned earlier, an event was either a positive outcome or a negative outcome. An event could also have a positive valence or a negative valence. Results demonstrated that participants who possessed a stronger actual-ideal discrepancy better remembered positive outcomes than negative outcomes. These same individuals also remembered positive outcomes better than those who possessed a stronger actual ought discrepancy. Individuals possessing a stronger actual ideal discrepancy also better

remembered positive outcomes with a negative valence better than positive outcomes with a positive valence.

There are some key differences to point out between self-discrepancy and regulatory focus highlighted by some of the jargon used in the above article. Self-discrepancy deals specifically with the fact that one's actual self may be discrepant from one's desired self whether that be an ideal self or an ought self. Discrepancies between actual and desired self are not a new concept in psychology; however, self-discrepancy theory did innovate in one specific way. Namely, it stated that there are two types of desired selves, the ideal self and the ought self. In the early to mid 90's, Higgins focused much research and thought on nature of the ideal and ought self. Thus, regulatory focus theory was born. While the Higgins and Tykocinski study did not examine regulatory focus as we will discuss it throughout this paper, it does provide early evidence that how individuals tend to guide their behavior affects their cognition, and as we will see, their evaluations, judgments, and task performance.

Regulatory Focus and Cognition

Regulatory focus has been shown to affect a variety of behaviors and cognitive processes, such as response criterions on a memory test (Crowe & Higgins, 1997; Friedman & Foerster, 2001), how individuals may encode or retrieve information for a memory test (Zhu & Levy, 2007) and how quickly individuals interpret ambiguous stimuli (Foerster & Higgins, 2005). For example, individuals took a recognition memory test after a regulatory focus manipulation (Crowe & Higgins, 1997). Those under a promotion focus showed a more relaxed response criterion as compared to those under a prevention focus. That is, they were more likely to name an item "studied" regardless of whether the item had actually been studied as measured by *b*. Other research suggests that individuals may be more likely to process relationships under a

promotion focus, whereas those under a prevention focus are more likely to process items for differences (Zhu & Levy, 2007). Zhu and Levy manipulated regulatory focus and asked participants to study a list of categorized words for a later memory test. First, participants took a free recall test, then took a cued-recall test where item categories were given as cues. Those under a promotion focus had higher ARC scores (Roenker, Thompson, & Brown, 1971) than those under prevention, a measure known to be representative of relational processing (Hunt & Seta, 1984). On the other hand, those under a prevention focus remembered more items on the cued-recall test, which should indicate greater item-level processing.

Regulatory focus also affects the speed at which individuals process navon type stimuli for the presence of letters (Foerster & Higgins, 2005). In Study 1, Foerster and Higgins presented participants with stimuli that were made up of capital letters. The letters together also formed a larger letter. For example, a stimulus may have consisted of many small capital F's that together formed the shape of a capital T. The participants were asked to identify whether a target letter was present in the stimulus. The target letter was sometimes a smaller (also called local) letter. Other times the target letter was the larger (also called global) stimulus. The researchers also measured participants' chronic regulatory focus. Results demonstrated a relationship between the strength of regulatory focus (being more or less promotion oriented or being more or less prevention oriented) and how quickly participants identified the target letters in the navon type stimuli. The stronger participants' promotion orientation the quicker they identified global target letters. Conversely, the stronger participant's prevention orientation the quicker they identified local target letters. Thus, the literature suggests that regulatory focus facilitates global vs. local processing, how individuals tend to elaborate on information intended for memory, and the criterions people set for responding to a recognition memory test.

Regulatory Focus and Creativity

Regulatory focus also has effects on the cognitive processes that contribute to creative thought (e.g. Friedman & Foerster, 2001; Bittner & Heidemeier, 2013; Baas, De Dreu, & Nijstad., 2011; Crowe & Higgins, 1997). For example, individuals under a promotion focused state tend to solve more embedded figures and generate more novel uses of a brick than those under a prevention focus and (Friedman & Foerster, 2001). Friedman and Foerster manipulated regulatory focus using a pencil and paper maze in which a mouse was seeking to exit. Participants played the part of the mouse. In the promotion condition, the mouse was trying to get out of the maze to reach a piece of cheese, whereas in the prevention condition the mouse was trying to leave the maze because he was being hunted by an owl. Following these manipulations, creativity measures were administered (Studies 1-4).

In Study 1, Friedman and Foerster demonstrated that individuals under a promotion focus are more able to dis-embed shapes from a background of noise using an embedded figures task. Study 2 showed that individuals under a promotion focus generate uses of a brick scored as being more novel on average than those under a prevention focus. Studies 3 and 4 were designed to explore the cognitive processes underlying these differences in performance.

Study 3 tested the idea that individuals use a more explorative response style under promotion as compared to prevention. Participants took a recognition memory test for 53 words. The researchers calculated response bias to judge whether participants adopted a riskier approach on the test. Participants in the promotion condition exhibited higher bias scores than those in the prevention condition supporting the prediction that people under a promotion focus engage a more explorative response style. Study 4 used a memory blocking paradigm to test the possibility that those under promotion are better able to overcome fixation when engaging in

creative tasks. In this paradigm, participants complete word-fragments with missing letters. Word-fragment completions are shown in two columns and participants are instructed to complete the fragments by row. The item in the first row is thought to activate a word that has a different meaning than the item in the second row, and thus inhibit the ability to bring to mind the solution for the second item in that row. Friedman and Foerster randomly assigned participants to a promotion or prevention condition and then asked them to complete as many word fragments as they could in 30 seconds. Participants in the promotion condition solved more fragments than those in the prevention condition. Taken together with the results from Study 3, this finding suggests that people are better able to overcome fixation and tend to be more open to solutions under promotion compared to prevention.

Based on the studies conducted by Friedman and Foerster, one might predict that people under a promotion focus will *always* perform better on creative tasks than those under a prevention focus, but that is not the case. Recall that individuals under a promotion focus experience facilitated global processing of information while those under prevention focus experience facilitated local processing of information. Other research suggests that global processing is also associated with assimilation of information from one's environment (Foerster, Lieberman, & Kuschel, 2008). This could mean that promotion focused people will use information from their surroundings that reduces the novelty of any creative products that they might produce.

Indeed, when individuals are presented with high quality exemplars, those under a promotion focus produce less creative art than those under a prevention focus (Rook & Knippenberg, 2011). Rook and Knippenberg asked participants to make an art exhibit out of Legos. Participants were shown either high quality exemplars, low quality exemplars, or no

exemplars prior to working on the task. Regulatory focus was manipulated by having participants write a story about how a mouse got out of a maze to find cheese (promotion) or escape an owl (prevention). Of particular interest here was whether or not participants imitated the presented exemplars as a function of regulatory focus and exemplar quality. Results indicated that those in the promotion condition that had seen high quality exemplars received higher imitation scores (as judged by raters) and produced less creative products (also as judged by raters) than those who were assigned to the prevention condition. The conclusion is that while a promotion orientation may enhance many cognitive processes that lead to more creative outputs, there are situations where it can harm creativity. In this case, promotion oriented individuals may incorporate information from their environment in order to mimic it. Another caveat in terms of how regulatory focus affects task performance and cognition is that of regulatory fit.

Regulatory fit

Regulatory fit can be defined as a match between one's regulatory focus and the means with which the goal is pursued (Higgins, 2000; 2002). Regulatory fit occurs when the method of goal attainment used sustains the current motivational orientation (Higgins, 2000, 2002). Promotion-focused individuals experience regulatory fit when they use eager means to approach their desired end state and prevention-focused individuals experience fit when they use vigilant means to avoid an undesirable end state, that of not attaining their goal. However, just because individuals view a goal as an accomplishment does not mean that they will always use eager means to achieve it. Similarly, viewing a goal as an obligation does not always mean individuals will use vigilant means to avoid obstacles. Rather, eager means in a promotion focus and vigilant means in a prevention focus are simply the preferred means of that regulatory frame

(Scholer & Higgins, 2013). It is certainly possible for people to use non-preferred means in goal pursuit, and when people use non-preferred means they experience regulatory non-fit or mismatch (Cesario et al., 2004).

Regulatory fit is not limited to a match between focus and the preferred means of goal pursuit. It can also arise from a match between focus and the type of stimuli encountered during goal pursuit. As we mentioned earlier, individuals in a promotion focus are more sensitive to the presence and absence of positive outcomes, while individuals in a prevention focus are more sensitive to the presence or absence of negative outcomes. Researchers refer to positive outcomes as *gains* and negative outcomes as *losses* (Idson, Liberman, & Higgins, 2000). Because individuals under a given regulatory focus are sensitive to specific kinds of outcomes, the presence or absence of those outcomes will influence behavior. When the outcomes match what individuals are more sensitive to, such as gains in a promotion focus and losses in a prevention focus, they experience fit (Worthy, Markman, & Maddox, 2009). If individuals experience gains (positive outcomes) during a goal related activity, they will also experience situations of non-gains (absence of positive outcomes). Conversely, if individuals experience losses (negative outcomes) during an activity, they will also experience non-losses (absence of negative outcomes).

If we think back to our twice bodyweight squat goal, we can construct a concrete example of gains and losses during goal pursuit. Imagine that an individual has a predominately promotion-focused orientation. As a means of reaching the desired weight on the bar, the individual might increase the weight by 5lbs each workout. If the individual hit all required repetitions at the higher weight on one particular training day, he would experience this as a positive outcome or gain. He may also experience non-gains during his training periods. For

example, he may fail to hit all required repetitions on the day of a weight increase. As a promotion-focused individual would be more sensitive to these gains and non-gains, we would expect to see a greater likelihood of goal attainment because his regulatory focus is being sustained. In this example, the individual can also experiences losses. He could become weaker as a result of poor training or recovery and need to lower the weight on the bar below a previously achieved level, a loss in maximum weight lifted. As losses do not fit with promotion, his self-regulatory focus would be interrupted rather than sustained.

Whether one is more likely to approach positive stimuli or avoid negative stimuli, called approach-avoidance, is related to the regulatory focus framework. Approach motivation is characterized by a heightened sensitivity to pleasant or positive situations and outcomes whereas avoidance motivation is characterized by a heightened sensitivity to negative or unpleasant situations and outcomes (Elliot & Thrash, 2010). The regulatory focus framework and the approach-avoidance framework share common language and definitions, but they are not synonymous. Approach and avoidance behaviors are both used within a given regulatory focus as both matches and mismatches with an end state occur during any activity (Scholer & Higgins, 2013). To illustrate how both approach and avoidance can operate under the same regulatory focus, consider the following situation.

Tom has a lifelong goal to be admitted to medical school, and he views this goal as an aspiration (promotion focus). Tom knows that to be admitted he needs good letters of recommendation, good MCAT scores, and a good GPA. He concerns himself with a desired end state that is a pleasurable event (being admitted to medical school), and because he is promotion-oriented he will approach all events that match with that desired end state. For example, he will attend extra tutoring sessions provided by his teaching assistant to maximize his GPA. He will

make sure to take as many practice MCAT tests as he can because he knows the more familiar he is with the test, the better he will perform. Tom is also concerned with avoiding certain things. Tom wants to avoid *not* doing the things that help him reach his goals. Tom will try to avoid *not* studying every day after his classes. He will also avoid *not* developing relationships with his professors as he knows he will need them for good letters of recommendation. As this example illustrates, Tom engages in both approach and avoidance during his goal pursuit even though he is under a promotion focus.

Methodology

I call attention to the variations in regulatory fit, and focus, manipulations for three reasons: first, to enable the readers to better understand the findings we will discuss throughout this paper; second, to demonstrate the power of the regulatory fit approach, and third; to address some of the issues regarding these manipulations that have not been explored in the extant literature. Regulatory fit phenomena occur in a variety of manipulations and contexts, which suggests that this framework has strong ecological validity, something that psychologists should always keep in mind when thinking about the importance of a finding.

There is evidence for the utility of the regulatory fit framework. To understand the ability of the framework to explain behavior, it is helpful to first understand how regulatory fit is instantiated. Methods of manipulating regulatory fit are as varied as the sub-fields in which it has been studied. To begin, there are two broad classes of regulatory fit manipulations: incidental and integral (Cesario, Higgins, & Scholer, 2008).

Incidental manipulations occur prior to and independent of the administration of the dependent variable. One incidental manipulation asks participants to write about their hopes and aspirations (promotion) or their duties and obligations (prevention) and list some means they

could use to attain their goals. Participants are directed to list either eager or vigilant means (Freitas & Higgins, 2002). This method of inducing regulatory fit is the most common method used in the literature when researchers want to use an incidental regulatory fit manipulation.

Incidental manipulations allow researchers to create regulatory fit or non-fit prior to and independent of any task of interest. Asking a participant to simply write about their hopes and aspirations or duties and obligations without listing means to achieve these goals would manipulate regulatory focus. Writing about hopes and aspirations would place individuals under a promotion focus and writing about duties and obligations would place individuals under a prevention focus. This is referred to as the essay method of manipulating regulatory focus.

In contrast to incidental manipulations, which take place outside of the dependent measure, integral manipulations occur during the measure itself. Research on attitudes and perceptual learning has used integral manipulations extensively. These can take such forms as matching the frame of a message with the suggested means of achieving this message in the case of attitudes research (Cesario, Grant, & Higgins, 2004) or the form of employing gains and losses with regulatory focus matching in the case of decision making research.

Regulatory fit can also be achieved by matching either a participant's current state or chronic focus. As regulatory focus is something that is learned through repeated experiences in childhood (Higgins, 1997), individuals have a chronic focus in which they tend to operate (see Higgins et al., 2001 for a measure of chronic focus). Researchers can manipulate fit by pairing an individual's chronic focus with stimuli that match, such as promotion focus paired with a gains structured task, or do not match, such as promotion focus paired with a losses structured task. Yet, one's regulatory focus can vary from moment to moment. Cognitive researchers commonly use a raffle ticket method to manipulate state regulatory focus. To instantiate a

promotion focus, participants are told that if they perform well enough on a task they will receive a raffle ticket to enter in a drawing for $50 (e.g. Worthy, Maddox, & Markman, 2007). In a prevention condition, participants are told that they already have a raffle ticket for entry, but must keep their performance above a certain level in order to keep the ticket.

Several important issues have not been addressed in this literature. As some of the regulatory focus and fit manipulations are more social in nature, it is possible that the manipulations are not effectively instantiated. For example, the effectiveness of the manipulation may diminish over time. In particular, incidental manipulations of regulatory fit may only last for several minutes. However, the question of exactly how long incidental manipulations of regulatory fit last is unanswered. This statement is equally true for methods of manipulating regulatory focus, especially the essay method manipulation. Another issue that is simply implied in some of the results of studies done on regulatory fit but never stated explicitly is that regulatory fit has carryover effects to other tasks. The incidental manipulation of regulatory fit relies upon this carryover effect. It could be that the different methods of manipulating regulatory fit produce stronger carryover affects to other tasks, but to the best of my knowledge only the essay incidental manipulation of regulatory fit has been examined. It is an open question whether or not if manipulating regulatory fit by matching focus and task reward structure leads to a carryover effect.

Finally, the effects of regulatory fit should be more explicitly tested with regards to when the manipulation is used. Incidental manipulations occur outside the context of the task, but some tasks have multiple components or phases. For example, memory tests always have an encoding or study phase followed by a memory test or phase. Manipulating regulatory fit at study, at test, or both could potentially lead to different effects. Some research has examined this

in regulatory focus, but not in regulatory fit. Friedman and Foerster (2001) replicated Crowe and Higgins (1997) study of how regulatory focus affects response criterions on a memory test. In this replication, Friedman and Foerster gave participants the regulatory focus manipulation either right before encoding or right before test. Recall that Crowe and Higgins found that participants used a more relaxed response criterion under a promotion focus compared to a prevention focus. Friedman and Foerster found that this effect only occurs if regulatory focus is manipulated immediately prior to the memory test. Perhaps regulatory fit also has different effects on tasks depending on when it is manipulated.

At least one study can be criticized based on several of the above discussed issues with regulatory fit and focus manipulations. Zhu and Levy (2007) found that a promotion focus aides relational processing, whereas a prevention focus aides item-level processing. In this study, regulatory focus was manipulated by having participants write an essay about their hopes and aspirations or their duties and obligations. This manipulation occurred immediately prior to the encoding phase of the memory test. Thus, we do not know if the regulatory focus manipulation was still instantiated during the test portion because we do not know how long these manipulations last. We also do not know if regulatory focus effects recall processes or if it only affects encoding processes because in this study regulatory focus was only manipulated prior to the encoding part of the test. Future studies could attempt to address some of these methodological deficiencies in regulatory focus and fit manipulations.

Researchers have used all the above methods to describe the effects of regulatory fit compared to non-fit. For example, regulatory fit can lead individuals to feel guiltier about past moral decisions (Camacho, Higgins, & Luger, 2003), make better decisions (e.g. Worthy, Maddox, & Markman, 2007; Otto, Markman, Gureckis, & Love 2010), be more persuaded by

arguments (e.g. Cesario, Grant, & Higgins, 2004; Lee & Aaker, 2004; Koenig, Cesario, Molden, Kosloff, & Higgins, 2009), and improve perceptual category learning (Maddox, Baldwin, & Markman, 2006). In the following sections, I will describe the specific effects of regulatory fit on behavior and the proposed mechanisms by which regulatory fit influences behavior. Regulatory fit has primarily been examined in three broad sub-fields: attitudes, decision-making, and learning.

Regulatory fit effects on attitudes and cognition

A number of studies have shown that individuals are more persuaded by messages when the individuals read these messages under regulatory fit conditions as compared to when they read them under regulatory non-fit. For example, Cesario, Grant, and Higgins (2004) found across four studies that participants were persuaded to eat more healthfully when they read a fit message.

To create regulatory fit in Study 1, Cesario et al. matched the content of the message with the types of means that individuals with a particular regulatory focus prefer. Recall that individuals with a promotion focus are concerned with growth and nurturance and that they prefer an eager means of goal pursuit, whereas individuals with a prevention focus are concerned with safety and security. To create regulatory fit for these individuals, Cesario et al. wrote their message to describe how eating fruits and vegetables leads to feeling better mentally and physically, and also more satisfied (promotion concerns). They also added a statement telling participants that by eating the recommended servings of fruits and vegetables, they would actively better their mood and level of satisfaction (eager means). To create non-fit for the promotion message, the researchers simply used vigilant means, instead stating that participants cannot actively increase their mood and level of satisfaction if they do not eat enough fruits and

vegetables. A prevention focused version of the message stated that eating fruits and vegetables would help protect the participants from the harmful effects of things like pollution and stress. Vigilant means (without eating fruits and vegetables, you can't protect yourself) created regulatory fit within this focus whereas eager means (you can actively protect yourself if you eat fruits and vegetables) created regulatory non-fit.

Results showed that participants intended to eat more fruits and vegetables after reading the message when it was a regulatory fit than when it was a mismatch. Participants also believed the message was more persuasive under fit. Subsequent studies replicated the results and also showed that these effects occurred when the message fit with a participant's *chronic* regulatory focus, was independent of participants' moods, and occurred even when regulatory fit was experienced prior to and independent from the persuasive message.

In Study 2, Cesario et al. measured chronic regulatory focus instead of manipulating regulatory fit solely through message contents. The message in study two was about an after school program, and the message contained either eager or vigilant means of achieving the program's stated goals. These means would either be in fit or mismatch with participants' chronic regulatory focus. Dependent measures include asking participants about how persuasive they believed the message to be as well as what their opinion of the program was, both rated on Likert scales. The researchers also measured mood in order to determine if regulatory fit affects mood and if this moderated the effects of fit on attitudes. Participants who were under regulatory fit, i.e. when the message frame matched chronic focus, believed the message to be more persuasive and had a better opinion of the program. Mood alone predicted participants opinions such that those who felt more positive believed the message to be more persuasive and had a better opinion of the program compared to those who felt less positive. However,

regulatory fit did not predict mood indicating that mood and regulatory fit have independent effects on attitudes. We will return to these studies when we discuss the mechanisms underlying regulatory fit effects.

There is additional evidence that regulatory fit enhances the persuasiveness of a message. Lee and Aaker (2004) found that participants viewed grape juice more favorably after reading a message that induced regulatory fit. In Experiment 1, participants read an ad for Welch's Grape Juice with either regulatory fit (pairing promotion with gains or prevention with losses) or regulatory mismatch (pairing promotion with losses or prevention with gains). After reading the ad, they were asked to rate on a scale of 1 to 7 how favorable their opinion was of the grape juice. Similar to Cesario et al.'s (2004) findings, participants had a more favorable opinion of Welch's Grape Juice when the message was presented with a regulatory fit than when it was presented with a mismatch. In addition to increasing the persuasiveness of a message, regulatory fit also affects the perceived value of an item.

People tend to judge that an item is more valuable when making the judgment under regulatory fit conditions (Higgins, Idson, Freitas, Spiegel, & Molden, 2003). Participants were given an option to choose a mug or a pen as compensation at the end of the experiment. One group was told to think about what they might lose in selecting the options while the other was told to think about what they might gain. Afterwards, they were asked to guess what the monetary value of the mug was. Results showed that participants believed the mug to be more expensive following a fit between their chronic regulatory focus and how they made their decision, either thinking about gains or losses. We can see from this and the previous evidence that people evaluate a variety of things as being better under regulatory fit conditions. This can include products, persuasive messages, and even the value of an object.

In addition to altering judgments about messages and monetary value, regulatory non-fit can make people feel guiltier about certain kinds of past behavior (Camacho et al. 2003). As individuals may feel right about something under situations of regulatory fit, they may also feel that something is wrong under situations of regulatory non-fit. Because individuals prefer either eager or vigilant means of goal pursuit under a promotion or prevention focus, they will evaluate their own actions in pursuit of a goal with respect to these preferred means of pursuit. Individuals are concerned with acts of commission (eagerness) and omission (vigilance), or in moral parlance, sins of commission and omission. In particular, individuals under a promotion focus should feel worse about sins of omission (a non-fit situation) because they failed to use eager means. Individuals under a prevention focus should feel worse about sins of commission than omission because they failed to be vigilant. Additionally, if people concern themselves with certain kinds of goals (nurturance or safety), they should also judge their actions more poorly when they failed to act in accordance with those goals. That is, if individuals are under a promotion focus and fail to help a friend through some trouble, they should feel worse about this failure of nurturance than they would if they had simply lied to someone (a failure of duty or obligation).

To determine how people feel about their moral errors, Camacho et al. asked participants to think about a previous time they did something wrong, such as a time when they made someone close to them feel insignificant. The prompts used either promotion criteria related to nurturance or safety and obligation criteria related to prevention. Those who scored higher on chronic promotion focus felt guiltier about promotion transgressions than they did prevention transgressions and participants who scored higher on chronic prevention focus felt guiltier about prevention transgressions than they did promotion transgressions. For example, a promotion-

focused individual may have been asked to report about a promotion transgression such as a time when he failed to help a friend or significant other. He could have reported that he did not console his girlfriend after she received a C on a final exam. He could also have been asked to report a prevention transgression such as a time when he lied to or cheated a friend or significant other. For example, he may have reported sleeping with another girl while in a committed relationship. Because this hypothetical individual was more promotion-focused, he would have reported feeling guiltier about not consoling his girlfriend than cheating on her on a scale of 0 to 8. The body of evidence presented thus far suggests that regulatory fit may affect several kinds of evaluations.

Regulatory fit also increases the likelihood that people will complete a goal (Spiegel, Grant-Pillow, & Higgins, 2004). Participants completed a visualization procedure to help with planning their schedule around finishing an essay. The researchers asked participants to write an essay about everything that they did the Saturday following their participation in the study. They were asked to imagine using either eager or vigilant means to complete the essay. Recall that individuals under a promotion focus prefer to use eager means to pursue goals and individuals under a prevention focus prefer to use vigilant means to pursue goals. Thus, the essay completion strategies participants imagined either fit or did not fit with their chronic regulatory focus.

Participants were asked to close their eyes and visually imagine how they would complete the essay. They visualized three different scenarios. In one scenario, they visualized when they would complete the essay. To vary planned means and manipulate regulatory fit, some participants visualized good times in which they could complete the essay (eager means),

whereas other participants visualized bad times in which they could not complete the essay so that they could avoid these times (vigilant means).

The second scenario that they imagined was where participants could complete their essay successfully. For the eager condition participants visualized a comfortable place in which they might write their essay. For the vigilant condition participants visualized places that may be uncomfortable or distracting so that they could attempt to not be in these places while writing their essay.

The third and final scenario was the how scenario. How involved the way in which participants would write their essay, particularly, the contents of their essay. For the eager means condition, participants were told to imagine themselves including as many details as possible in their essay in order to make it interesting and paint a clearer picture. For the vigilant means condition participants were told to visualize themselves not forgetting details and doing their best to avoid making their reports boring.

Participants in the fit conditions (promotion/eagerness and prevention/vigilant) were 48% more likely to turn their essays in than those in the mismatch conditions (promotion/vigilant and prevention/eagerness). One could interpret these results as indicating that preparing to use the means preferred by one's primary regulatory focus increases motivational strength and assists in goal attainment. Spiegel et al. provides evidence that regulatory fit affects real behavioral outcomes in addition to object evaluations.

The previous discussion provided evidence that regulatory fit affects moral and monetary evaluations, persuasive messages, and motivational strength. These experiments provide evidence that regulatory fit may be a general phenomenon that affects a variety of self-relevant

evaluations as well as goal-directed behavior. However, as evidenced by cognitive and decision-making research, regulatory fit also alters cognitive processes.

Perceptual Learning and Decision Making

Researchers have investigated regulatory fit and mismatch using a different approach in the perceptual and decision making literature as compared to the attitudes literature. These researchers operate within paradigms that give them tools frequently unavailable to attitudes researchers such as complex mathematical modeling and large data sets for individual participants (Markman, Maddox, Worthy, & Baldwin, 2007). Cognitive scientists also have the ability to examine specific mental processes with respect to phenomena.

One such experiment showed that regulatory fit causes individuals to solve difficult rather than easier creative problems (Maddox, Markman, Worthy & Baldwin, 2007). Maddox et al. asked participants to take a random associates test (RAT; Mednick & Mednick, 1967). On the RAT, some items are difficult, others are of medium difficulty, and others are easy. The researchers manipulated regulatory focus using the raffle ticket method. The goal of the RAT is to solve each item successfully, so Maddox et al. assumed it was an inherently rewarding task using a gains structure. Results showed that participants who were in the regulatory fit condition solved a greater proportion of hard items than those who were in the mismatch condition, while those in the mismatch condition solved a greater proportion of easy items demonstrating the effects of fit on a cognitive task. Markman et al. interpreted this data as suggesting that regulatory fit improves performance and potentially cognitive flexibility.

There are some problems both with these interpretations and with these data. For example, it is not clear that regulatory fit affected either task performance or cognitive flexibility. The data only show that participants solved more difficult problems under regulatory fit and

more easy problems under regulatory non-fit. This pattern of results could be accounted for by simply stating that regulatory fit and non-fit cause people to have different task preferences. People under regulatory fit may simply prefer challenging tasks, whereas people under non-fit may prefer easy tasks. Additionally, there are some issues with the task. The remote associate items chosen for this experiment are frequently unpredictable and ambiguous. RAT items chosen from Mednik sometimes have answers that are ambiguous. Other times the answers are not as obvious. In a RAT problem, participants are given three words and must come up with a fourth word that fits each of the three given words. In the Mednik RATs, the solution sometimes is a compound word formed with each of the three given words. Other times it is simply a Word related to the given words. Thus, these items may be more difficult. Regarding the ambiguous RATs, the solutions sometimes makes no sense. Take, for example, this RAT item: measure, desk, scotch. In this case, the "correct" answer is "tape." Two of the words make sense with tape: "tape measure" and "scotch tape." However, "desk tape" and "tape desk" make little to no sense, yet this is considered the correct answer. These issues could have skewed Markman et al.'s data.

The other issue with this experiment is that of the regulatory fit and non-fit manipulation. Regulatory focus was actually manipulated in an unrelated study that occured prior to and independent of administration of the RAT problems. This could have weakened their regulatory fit manipulation. Or, perhaps there was no regulatory fit or non-fit because the manipulation had worn off. Again, these issues make it difficult to interpret Markman et al.'s data. On the other hand, this is not to doubt that regulatory fit has effects on task performance and attitudes, only that Markman et al.'s experiment lacks in a number of ways that compromises the conclusions drawn from it.

Regulatory fit also improves performance on a perceptual learning task (Markman, Baldwin, & Maddox, 2005). They showed participants dots on a screen and asked them to guess which of two categories a dot belonged to. The positions of the dots on the screen were varied on the horizontal and vertical axes with a dot belonging to a category based upon where it was displayed along these two dimensions. Participants used trial and error to discover where in particular a dot would belong to a specific category. Results indicated that participants who were in the regulatory fit conditions performed better than those in the regulatory mismatch on the dot task. In other words, they were more able to decipher the rules that predicted which category a dot belonged to. This experiment provides evidence that regulatory fit may enhance learning in a trial and error context. We will discuss more regulatory fit findings in the cognitive literature as we begin to explore proposed mechanisms underlying these effects.

Proposed Regulatory Fit Mechanisms

Feeling of rightness

Some have hypothesized that experiencing regulatory fit may lead people to experience a feeling of rightness that they misattribute to the current persuasive message (e.g. Cesario et al., 2004). Indeed, people frequently misattribute a variety of internal experiences as being relevant to their current task (e.g. Johnson & Raye, 1981; Tversky & Kahneman, 1973; Clore 1992). For example, Cesario and colleagues investigated this by manipulating regulatory fit incidentally showing that it could influence behavioral intentions when it occurred prior to and independent of a persuasive message. This finding suggests that some aspect of the fit experience must carry over to the current task and influence judgments about that task. In the Cesario et al. study, participants viewed messages as being more persuasive under regulatory fit than under non-fit.

Cesario and colleagues further explored the hypothesis that regulatory fit induces a "feeling of rightness" by examining how it might affect evaluations. For example, one might predict that feeling right about something should lead to increased confidence in one's current judgments or behavior. In Study 3, Cesario et al. manipulated regulatory fit outside of message content and asked participants to rate their opinions about a school education proposal after a regulatory fit or non-fit manipulation. The researchers believed that if regulatory fit was a misattribution of an internal state as information relevant to an evaluation they manipulated fit prior to asking individuals to read an unaltered persuasive message should lead to the same results. Cesario and colleagues also wanted to ensure that it was an internal feeling of rightness that was leading to the discovered effects. To do this, they directed participants' attention to their internal state.

In one condition participants were asked to determine the source of the feeling of rightness they had experienced during the regulatory fit task. They were told that sometimes people feel right about their goal pursuit and to indicate on a Likert scale how right they felt about their current goal pursuit. In the other condition, they were not asked to determine the source of this feeling. After rating their attitudes about the education proposal, people in both conditions were asked how confident they were in their opinions. People in the regulatory fit condition who had not been directed to focus on the source of their feeling of rightness indicated that they felt more confident about their proposal judgments than people in the non-fit condition with the same attentional manipulation. However, people in the regulatory fit condition who first thought about the source of their feeling of rightness before reading the proposal actually felt less confident about their feelings compared to those in the non-fit condition. This finding seems to indicate that participants believed that their ratings may have been influenced by the previous

task. In other words, they were able to understand that they did not feel "right" because of the persuasive message they were asked to evaluate, as evidenced by the fact that they rated it less persuasive than the non-attention directed condition.

However, the exact nature of this feeling of rightness is unclear. Researchers describe this feeling as non-emotive and the evidence indicates that it is independent of mood, but if anything this makes it harder to ascertain exactly what the feeling of rightness is. Earlier we described how Cesario et al. had asked participants to rate how right they felt about their current goal pursuit. It is worth noting that Cesario and colleagues do not report the results of this data anywhere in this article. If a feeling of rightness is the driver behind some of the effects of regulatory fit then we should see that participants feel more right under regulatory fit than non-fit. In defense of those who have conducted research on regulatory fit, sometimes people are poor judges of their own internal states. For example, in the metacognition literature we find regularly that people over-predict how well they will perform on a variety of tasks (e.g. Kruger & Dunning, 1999; Geraci & Miller, 2011). The social psychology literature also shows that people perform badly at affective forecasting. In this case people are sometimes asked to say how long a negative feeling will last after an experience. People routinely predict that the negative feeling will last much longer than it actually does (e.g. Wilson & Gilbert, 2003; Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998). Future research on regulatory fit should incorporate other methods of determining what this feeling of rightness is. For example, researchers could ask for open ended reports about how participants felt during goal pursuit. Researchers could also ask about what kinds of task relevant strategies people adopt under regulatory fit and non-fit. Both of these methods could provide clues as to how regulatory fit affects evaluations and task performance.

So far we have discussed how experiencing regulatory fit causes people to alter their subjective judgments about persuasive messages and that one possible mechanism for this finding is that people misattribute the feeling of rightness that occurs due to regulatory fit. Another proposed mechanism for how regulatory fit influences cognition and attitudes is that fit enhances ease of processing.

Ease of processing

Regulatory fit has also been shown to engender a subjective ease of processing (Lee & Aaker, 2004). In Experiment 4A, participants read a message designed to induce regulatory fit or one designed to induce non-fit, and were asked to rate each message on ease of processing and comprehensibility using a Likert scale. Those in the fit condition rated the message as easier to process and comprehend than did those in the non-fit condition. In a follow-up experiment, 4B, Lee and Aaker used the same kind of regulatory fit manipulation and asked participants to identify words flashed briefly on the screen. Four words were associated with the promotion-focused message while four were associated with the prevention-focused message (see the description of Cesario et al. for an example persuasive message). Participants correctly identified more words when they had been exposed to a regulatory fit message and frame than when they had experienced a mismatch. Thus, ease of processing may also be as a factor leading to the previously discussed feeling of rightness.

The methods used to examine the ease of processing that may be instantiated under regulatory fit are somewhat lacking. Notably absent from Lee and Aaker is an objective measure of processing and comprehension. All that is presented are the subjective ratings. A study should be conducted in which individuals read a message under regulatory fit and are then asked comprehension questions about the message. This would suggest whether the message was

actually comprehended better or not. It is also unclear exactly what is causing the improved perceptual identification. It seems that participants or more mentally ready to process information related to the focus of the original message. This related information may not have been presented previously. In other words, regulatory fit may act to prime individuals to process information related to their previous regulatory focus. Perhaps regulatory fit simply primes individuals to process any information related to a previous regulatory focus. In Lee and Aaker, participants more readily identified words associated with Welch's grape juice, but maybe any information that could be construed as leading to personal growth or vigilant safety would be more readily identified after experiencing regulatory fit under the related focus.

Lastly, we do not know from Lee and Aaker's experiments if participants found the message more fluent and that this is what resulted in the subjective ease of processing and comprehension. There are two different possibilities. One possibility is that in fact participants found the message more fluent. That is, comprehension of the message required fewer cognitive resources such as working memory or attention. The other possibility is that participants simply paid more attention to the message under regulatory fit as compared to non-fit. The latter would imply that regulatory fit implicitly motivates people to better attend to stimuli in their environment, or least to stimuli relevant to the task at hand.

To my knowledge, only one set of experiments of any kind explored the possibility that regulatory fit reduces the cognitive resource requirements of performing a task. In an unpublished master's thesis, Maxfield (2011) presented participants with a working memory task and asked them to perform it under regulatory fit or non-fit. Performance using the manipulation was compared to a participant's baseline.

In this working memory task, participants must split their attention between two tasks. First they must engage in an ongoing task in which they perform simple arithmetic problems such as 2 + 5(2) = 12. In this version of the task, their job was to quickly solve the problem. They are also presented with letters immediately following the completion of a math problem. The letters must be remembered for a memory test after a certain number of math problems. The more math problems and letters presented, the more difficult the task becomes as it requires more working memory capacity. Trials randomly vary in the number of letters presented, typically from two to seven for a total of 81 math problems and 81 letters. Of critical importance to the validity of this measure of working memory is that participants must be engaged with the ongoing task at a high performance level. If participants performed poorly on the math problems, the task may only measure short term recall. This task, also referred to as the operation span task (OSPAN), measures the amount of information individuals can hold in mind while they are otherwise occupied. Individuals with a higher working memory capacity will be able to hold more letters in mind than those with lower working memory capacity. If regulatory fit reduces the amount of cognitive resources required to perform a task, then individuals under fit should perform better as compared to their baseline than individuals under non-fit compared to their baseline.

Results demonstrated that participants under regulatory fit did remember more words as compared to those under non-fit. However, this effect was only found for those participants with the lowest baseline OSPAN scores. No differences emerged for those with the highest baseline scores, but this could be due to ceiling effects. The performance improvement for the lower half of participants was moderated by the fact that participants in the regulatory fit condition spent significantly longer solving the math problems than those in the non-fit condition. Although this

master's thesis is unpublished, the data points to possibility number one discussed previously. Individuals under regulatory fit may attend more to information than individuals under regulatory non-fit, and this greater focus comes at the cost of using more cognitive resources.

The attitudes literature proposes that regulatory fit effects, as compared to non-fit, may lead to a feeling of rightness that people misinterpret as relevant to a given task or evaluation (e.g. Cesario et al., 2004; see Cesario, Higgins, & Scholer, 2008 for a review). Regulatory fit may also increase individuals' confidence in their evaluations (Cesario et al.). The feeling of rightness may occur because a message that induces regulatory fit is more fluently processed (Lee & Aaker, 2004). When the purpose of a persuasive message is to make attitudes more positive about a product or behavior, increased confidence and a feeling of rightness both predict the message will be more persuasive. However, these two theories (confidence and a feeling of rightness) make different predictions about what the effects of a negative message might be.

Confidence vs. Feelings as Information

Confidence may lead people to view a target more negatively whereas a feeling of rightness may lead people to be less persuaded by a message to avoid the target. Some advertisers are interested in convincing consumers to avoid buying a product or engaging in a certain behavior, such as the classic Partnership for a Drug Free America ad "This is Your Brain on Drugs," which used frying eggs as an analogy for the harmful effects drugs have on the brain. Recall that individuals may wrongly interpret their present feelings as information relevant to a task of judgment. If the feeling of rightness that occurs due to regulatory fit acts like a "feelings as information" effect, regulatory fit may cause a negative message to be less persuasive as individuals misattribute the positive feelings they receive from regulatory fit to the message target. On the other hand, if regulatory fit makes individuals more confident about their

message-based judgments, it should increase the persuasiveness of the message as individuals consider their evaluations to be more reliable.

The amount an individual feels involved in something may determine whether confidence or a feeling of rightness affects evaluative judgments (Avnet, Laufer, & Higgins, 2013). Individuals sometimes make judgments based on how they feel about the target object while other times they make judgments based on their cognitive evaluations of the target (Avnet et al.). If an individual feels good about a target (remember that the source of the feeling may not be related to the target) they would evaluate the target positively. On the other hand, if people think a target has negative attributes or characteristics, they would evaluate the target negatively. Avnet et al. reasoned that if individuals care greatly about a task or activity then they will place a lot of importance on their evaluations. However, if individuals care little about a topic they may instead rely on their feelings to make a judgment.

To test the role of involvement in judgments, Avnet et al. conducted several experiments that paired different levels of topic involvement and measured participant reactions to a persuasive message. Regulatory fit was also manipulated. The key component in these studies was the type of persuasive message used. Namely, Avnet et al. presented participants with a negative message that attempted to convince participants that the target was bad in some way, such as the possible negative effects of caffeine (Study 1) or the quality of an airline (Study 3). The general procedure was to manipulate (or measure in Study 2) task involvement, manipulate regulatory fit or non-fit before the persuasive message (or within it in Study 2) followed by presentation of the persuasive message and measurement of attitudes about the target. Results showed that participants had more negative attitudes about the target after reading the negative information only when they were also under high involvement and had experienced regulatory

fit. In contrast, when involvement was low, participants viewed the target more positively after experiencing regulatory fit than after non-fit, even though the message was filled with *negative* information.

One way to interpret these findings is to consider the roles of confidence and feelings of rightness (Avnet et al.). The individuals under high involvement became more confident in their evaluations of the target, which may have been greatly influenced by the negative information the persuasive message relayed. Those under low involvement would have experienced a feeling of rightness due to the regulatory fit manipulation and interpreted this feeling as relevant information about the target. Involvement in the task may be of particular importance to cognitive researchers considering their relatively drier paradigms in which they explore regulatory fit. As Avnet et al. demonstrated, high involvement may lead to greater confidence in and reliance on one's evaluations, but low involvement may lead participants to interpret a feeling of rightness as task relevant information.

In summary, the attitudes literature shows that regulatory fit can affect many different types of evaluations. Regulatory fit can make messages more persuasive and lead people to assign greater value to an object (Cesario et al., 2004; Higgins et al., 2003). For example, messages might seem persuasive under regulatory fit because people misattribute a feeling of rightness as information relevant to the message. Or, they may feel more confident about their evaluations. These two mechanisms (confidence and a feeling of rightness) are qualified by the level of one's involvement in the object being evaluated. High involvement may lead to greater confidence in an evaluation, while low involvement may lead to a "feelings as information" effect whereby feeling right is interpreted to mean the message target is good. A feeling of rightness may come about through more fluent processing under regulatory fit. However, the

attitudes literature is only one set of investigations in regulatory fit. Other literatures provide helpful insight into additional proposed mechanisms of action.

Flexible processing

Recall that Maddox et al. (2007) found that individuals focus on solving more difficult remote associate items when they experience regulatory fit than when they experience mismatch. The authors interpreted these results to indicate that regulatory fit leads to more flexible processing, whereas regulatory mismatch leads to less flexible processing. Clearly, flexible processing would assist individuals in solving difficult remote associates.

To examine whether regulatory fit leads to more flexible processing in category learning, Maddox, Baldwin, and Markman (2006) used a perceptual learning task while manipulating regulatory fit. They hypothesized that regulatory fit should lead to flexible, conscious processing and testing of explicit categorization rules while regulatory mismatch should lead to inflexible unconscious processing that relies on a procedural learning system.

In these types of category learning tasks participants are presented with line segments and asked to categorize them into one of two categories, such as category A or B. The lines may vary in qualities such as length, position, and angle of presentation. Whether a given line segment will belong to either A or B is determined by an algorithm. The participant's goal is to learn over several hundred trials which segments belong to which category and an accuracy criterion can be used either to remove low performing participants (who may be using an inefficient learning strategy) or as a goal for the participant to achieve.

Regulatory focus was manipulated similarly to the previous paper by using the raffle ticket. In the first experiment a gains reward structure was used in which participants received two points for a correct response and zero points for an incorrect response. Both the promotion

and prevention focused groups could earn an entry by obtaining 86 points on the categorization task. This performance criterion could only be achieved by using a rule-based approach to the categorization task that combined the different traits of the line segments (e.g. length and angle). Participants in the regulatory fit group of this experiment achieved the performance criterion at a greater rate as compared to the mismatch group and also completed the categorization task with greater accuracy. Experiment 2 used a losses reward structure in which participants lost three points for incorrect responses and lost zero points for correct responses. The ticket criterion was still set at the 86 point level. Again, the regulatory fit group had both higher accuracy and obtained the criterion level at a greater rate compared to the mismatch group. The researchers concluded that because optimal performance could only be achieved by using an explicit rule testing approach, regulatory fit must encourage or facilitate flexible, explicit processing.

Having determined that explicit processing is engendered by regulatory fit, Maddox, Baldwin, and Markman (2006) hypothesized the opposite regulatory situation: that regulatory mismatch, should lead to *reduced* conscious processing. To this end, Maddox et al. created a line categorization task similar to the one used in the afore-mentioned study, but the categories for this new task had sets of overlapping characteristics, making performance difficult. In fact, optimal performance was only 77%. In addition to using the previous type of regulatory fit manipulation (gains vs. losses structure with a raffle ticket entry), participants were also randomly assigned to either a condition in which the task raffle ticket criterion was set fairly low and would be easy to reach or a condition in which the raffle ticket criterion was impossible to reach given the nature of the categorization rules. The best rule for categorization was also obvious early in the trials. Maximum performance on this task could only be achieved by using the early, obvious rule long enough to refine it instead of being flexible and testing multiple

rules. Indeed, participants under regulatory mismatch who had been assigned to the impossible criterion condition had better category assignment accuracy than those under regulatory fit. From these two studies, there is strong evidence that regulatory fit encourages or facilitates an explicit multiple rule testing strategy while regulatory mismatch facilitates an implicit, or unconscious, single rule refinement strategy.

We know that participants under regulatory fit were more flexible in their learning because of what tends to happen on these kinds of perceptual category learning tasks. Participants usually begin by choosing a unidimensional categorization rule. The previous two studies used categorization rules that required participants to categorize based on two dimensions rather than just one. As a result, participants who switched from unidimensional rule testing strategies to two dimensional rule testing strategies learned the categorization quicker. Indeed, when Maddox et al. fit participants' data to a model they found that those under regulatory fit switched to a two dimensional rule testing strategy earlier than those under regulatory non-fit. Therefore, when we say that participants are more flexible in their processing we mean that they are better able to choose different mental strategies.

Decision-making research also supports the idea that regulatory fit encourages conscious, flexible processing while mismatch reduces cognitive flexibility. Worthy, Maddox, and Markman (2007) asked a group of participants to select cards out of one of two decks in a typical decision making task. During this task, participants selected cards over several hundred trials using either a gains or losses structure and with regulatory focus manipulated. The participant's goal was to reach a performance criterion in order to retain (prevention) or obtain (promotion) a ticket for a money raffle. To test the idea that fit leads to flexible processing and non-fit leads to less flexible processing, the two card decks were created to be distinct from one another.

One of the decks was called the "advantageous" deck. While points earned or lost varied on individual trials, choosing many cards from this deck would lead to better performance compared to choosing many cards from the other deck, termed the "disadvantageous" deck. However, participants did not know which card selection strategy would lead to better performance. They were expected to learn this during the course of the decision making task. In fact, the decks were constructed so that the first few trials appeared to run counter to the advantageous/disadvantageous deck distinction. The better deck initially appeared to give low point totals (or cause high point losses in the losses structured version) while the worse deck initially appeared to be the better choice. In order to discover that the advantageous deck in fact will lead to a greater likelihood of reaching the criterion, they must be willing to choose cards from both decks and discover the overall pattern of the point totals. Worthy et al. theorized that participants needed to monitor their ongoing performance to discover the better deck, a form of explicit processing. Results showed that participants in the regulatory fit conditions reached the criterion more often compared to those in the regulatory mismatch conditions.

In cognitive domains, what matters is not necessarily regulatory fit or the phenomena being studied, but whether or not the tasks require cognitive flexibility (Maddox & Markman, 2010). The evidence strongly suggests that regulatory fit facilitates explicit, conscious thought. This evidence is in contrast with the attitudes literature that suggests that regulatory fit is associated with subjective fluency, increased confidence, and a feeling of rightness. Researchers who seek to apply regulatory fit to novel areas would need to be aware of all the literatures to make accurate predictions. In this dissertation, I consider the influence of fit on memory performance.

Conclusions and Future Directions

Memory is an area ripe for exploration with regulatory fit. Recent evidence suggests that motivational orientation affects memory performance in older adults (Barber, Mather, & Gatz, 2015; see also Barber & Mather, 2013). Barber and colleagues suggested that when older adults are placed under threat, they approach memory tasks using a prevention-focused motivational orientation. This stereotype-threat-induced state then reduces performance on standard memory (Barber & Mather, 2013) and neuropsychological (Barber et al., 2015) tests.

Barber and colleagues, among others, suggested that these stereotype threat effects may be due to regulatory mismatch (see also Grimm, Markman, Maddox, & Baldwin, 2009). Typically, older adults perform worse on standard explicit memory tests than younger adults. Research on stereotype threat effects has found that older adults under threat will perform even worse than older adults not under threat (e.g. Hess, Auman, Colcombe, & Rahhal, 2003). If we think about a memory test in terms of regulatory focus and fit, a memory test is in essence an implicit gains structured task. It is implicitly rewarding to remember an item if the goal of the task is to remember as many items as possible. Some researchers suggested that stereotype threat induces a prevention-focused state. Therefore, individuals taking a memory test under stereotype threat would experience a mismatch between their prevention focused state and the gains structured memory test. Barber and colleagues tested this hypothesis in older adults.

Barber et al. recruited a group of older adults and administered to them a battery of cognitive tests designed to diagnose dementia. Of interest to us, was the inclusion of the word list test. This test is commonly used in the diagnosis of dementia. This test presents participants with a list of 10 words and then asks them to recall as many words as they can remember. After this they are presented with the same 10 words and again asked to remember as many as they

can. Lastly, they are given a recognition memory test for the 10 words. The results of this experiment can shed some light on if regulatory fit affects memory performance.

The older adults were randomly assigned to one of four possible conditions. The conditions were generated by crossing stereotype threat with task reward structure. Threat had two levels: threat and non-threat. Task reward structure was either gains or losses. Barber et al. predicted that the older adults assigned to the threat condition and the gains structured version of the memory test should show of traditional stereotype threat affects when compared to the participants not under threat also taking the gains structured version of the task. That is, the former group should remember fewer words correctly. Barber et al. also predicted that participants under stereotype threat taking the losses structured version of the memory test should perform no worse than participants not under threat regardless of whether they were taking the gains or losses structured version of the test.

The experimental procedure was as follows. First, participants were given a battery of cognitive tests that served as their baseline. These tests were the exact same tasks that participants would take after the experimental manipulation but used different materials. After the baseline tests, participants underwent the stereotype threat induction procedure. Those placed under stereotype threat read a passage of information designed to highlight the memory declines associated with aging. Those not placed under threat did not read a passage. After the manipulation, participants took the word list memory test. The reward structure of the memory test was manipulated by using poker chips. Those in the gains structured version of the test received poker chips every time they correctly remembered a word. Those in the losses structured version of the test lost poker chips every time they failed to correctly remember a word. Following the memory test, participants completed several questionnaires, after which

stereotype threat was manipulated a second time by having participants read a passage of the other cognitive declines associated with aging. Following the second manipulation, Participants completed the rest of the cognitive test battery.

Barber et al. found results that somewhat matched their hypotheses. Participants under stereotype threat performed worse than those not under threat in the gains structured version of the task. Participants under threat who took the losses structured version of the memory test performed better than those not under threat who also took the losses structured version. These results are somewhat consistent with the regulatory fit hypothesis that states that task performance is worse in a regulatory mismatch situation than in a regulatory match situation.

In another study on regulatory fit in memory in older adults, Barber and Mather (2013) manipulated stereotype threat and gave participants a memory test. In this memory test, participants studied a list of 20 words and took a free recall test for this list of words. Then, they studied the same list again and took another free recall test. Participants underwent four of these study-test cycles after which they were given a recognition memory test for the studied words. Some of the items studied were gains items and some of the items were losses items. Participants earned points for remembering the gains items and lost points for not remembering the losses items. Thus, regulatory fit was manipulated within participants. Fit was achieved only for participants under stereotype threat when attempting to recall a losses item. Barber and Mather found that participants remembered more gains related items in the threat condition than in the no threat condition. Participants in the threat condition also remembered more losses related items than those in the no threat condition. Results for the gains related items replicate the typical stereotype threat effects.

There are some limitations to the preceding two studies. If we wish to use these studies to inform our knowledge of how regulatory fit would affect memory performance, this would be a difficult task. The regulatory fit hypothesis states that performance should be better under fit than under non-fit, but this is not exactly what Barber and colleagues found. There was indeed an interaction between stereotype threat and task reward structure but not in a way that fully supports the regulatory fit hypothesis. If stereotype threat induces a prevention-focus, then what should happen is those under this prevention focus should perform better on the memory test when it is a losses structured test than those under the prevention focus taking the gains structured version of the test. Barber and Mather (2013) report results showing that participants under threat actually remembered fewer losses related items than gains related items. For the word list memory test, participants under threat remembered just as many words in the losses structured version of the test as those taking the gains structured version of the test.

There are several possible explanations as to why these data do not entirely match the regulatory fit hypothesis. One possibility is that stereotype threat does not induce a very strong prevention-focused state. If the prevention focus is weak, this would lead to a weaker regulatory fit and a weaker regulatory mismatch. Another possibility is that stereotype threat affects are not reliably obtained. This would imply that only some of the participants in this study were under stereotype threat, which would mean that only some of the participants were actually in a prevention-focused state. Finally, the memory tests administered are not like typical memory tests in much of the memory literature. It is more typical to see a memory test that is either a recognition memory test or a free recall memory test. It is also more typical to see only one study and one test trial, not several cycles. It is possible that multiple study test cycles allowed

participants to overcome the effects of regulatory mismatch. This possibility would muddy the effects of regulatory non-fit on memory performance in both of the preceding studies.

The preceding studies also have some other issues. For example, there is no exploration of the mechanisms behind the effects of regulatory fit on memory. We have discussed the proposed mechanisms behind the effects of regulatory fit on different phenomenon, such as the feeling of rightness and enhanced explicit processing, but no research has examined why regulatory fit would affect memory performance. Another issue is that there is more than one type of regulatory fit and non-fit. Regulatory fit can be achieved under both a promotion focus and a prevention focus. Under a promotion focus, regulatory fit could be achieved by having participants take a gains structured memory test. Under a prevention focus, regulatory fit could be achieved by having participants take a losses structured memory test. The only regulatory fit condition examined in research on memory is that of matching a prevention focus with a losses structured task. One regulatory non-fit condition is also missing. Regulatory non-fit can be achieved under a promotion focus by having participants take a losses structured memory test, whereas non-fit can be achieved under a prevention focus by having participants take a gains structured memory test. The only non-fit condition to be examined in memory research is prevention combined with a gains structured task. It is important to include both types of regulatory fit and non-fit in order to be certain that one's effects are due to regulatory fit and non-fit and not just a main effect of a particular regulatory focus or task reward structure. It is also important to include both types of regulatory fit and non-fit because sometimes the effects of a particular focus are counterintuitive on a task, such as we discussed earlier with the interaction between promotion and production of creative art when exemplars are present.

While there are some issues with the limited literature on memory and regulatory fit we can conclude that it is likely that regulatory fit affects memory performance in some way. Future research could examine how regulatory fit affects memory performance using more traditional manipulations of regulatory focus, more typical memory paradigms, and that attempt to explain how regulatory fit would affect memory performance. The mechanisms proposed to be responsible for regulatory fit phenomena could also be explored in memory, rather than just how regulatory fit affects memory performance. For example, what are the consequences of feeling more right about one's memory or memory performance?

Based on the literature review on the effects of regulatory fit, it would seem that any target that may be evaluated in terms of its' goodness should be affected by regulatory fit and non-fit and that confidence in such evaluations should also be influenced by regulatory fit. It follows, then, that if regulatory fit leads to a feeling of rightness which affects the previously mentioned kinds of judgments, it should also lead to a feeling of rightness which affects any judgment, such as a judgment about memory. To the best of my knowledge, no research has examined the effect of regulatory fit on memory judgments, memory confidence, or memory predictions. The goal of the current studies is to test whether regulatory fit affects memory confidence.

Memory Confidence

Regulatory fit and non-fit may affect memory confidence to both accurate and inaccurate memories. Recall that regulatory fit makes individuals feel "more right" than regulatory non-fit about a target they are evaluating. They can also feel more confident in their evaluation of the target. If individuals are placed under regulatory fit in a standard recognition memory

experiment, we could predict that individuals would be more confident, compared to regulatory non-fit, in their memory judgments.

Some paradigms, notably the investigations of memory using signal detection (see Yonelinas & Parks, 2007), ask participants to make confidence judgments about their memory. For example, participants might be shown a list of words and told to memorize them. After study, they may be given a recognition memory test in which they are shown words and asked to indicate whether each word occurred previously or not. After making this decision about a word, a form of a memory judgment in and of itself, they would be asked to indicate their confidence that their decision was correct on a scale from 1-5 with 1 being very low and 5 being very high.

One question people have asked about memory confidence is the relationship between confidence in one's memory and whether that memory is accurate. Phrased another way, does higher confidence predict more accurate memory? Sometimes it does, and sometimes it does not (Roediger, Wixted, & Desoto, 2012; Roediger, 2008). The relationship between confidence and memory accuracy depends on a number of factors, including the nature of that which is to be recalled (Roediger & DeSoto, 2013). For example, when there is little similarity between to be remembered words and lures on a memory test, the correlation between memory confidence and memory accuracy is high (Roediger & DeSoto). Another example of when confidence and memory are highly related is when to be remembered information does not require us to draw inferences that are not provided (Brewer & Sampaio, 2006).

Another example of a strong positive relationship between memory accuracy and memory confidence is that of emotionality and memory predictions, if we take memory predictions as a kind of memory confidence (Zimmerman & Kelley, 2010). In this paper, Zimmerman and Kelley report data asking participants to make item level predictions for

emotional words. Words were divided into three emotional types: positive, negative, and neutral. Predictions for the positive and negative word types were higher than for the neutral word types. In terms of the relationship between confidence and memory accuracy, there was evidence that on a cued recall test the relationship between predictions and memory was positive for the positive word types. The above represent a few cases where memory confidence and accuracy match. However, much of the interest in recent decades on the relationship between memory and confidence has been on the situations in which confidence in memory is not reflective of accurate recollection. Some researchers have even constructed a method of reliably generating high levels of inaccurate memories.

A now classic example of confidence not being reflective of accurate memory comes from studies using the Deese, Roediger-McDermott (DRM) False Memory Paradigm (Roediger & McDermott, 1995) (see Pezdek & Lam, 2007 for a review of false memory paradigms). In the DRM paradigm, participants are given a list of words to study for a later memory test. On the memory test, they are asked to judge whether a presented word appeared on the study list or not. The study list (or lists) has an important characteristic not used in more typical memory paradigms. Namely, the words on the list are sets of related words, with a twist. One set of related words might include such words as bed, pillow, and dream. Of critical importance to this paradigm, is that each of the words in a set is related to a word that is not presented in the set. In the above example, the unpresented word is the word "sleep." This word would then be shown to participants on the recognition memory test. This related but unstudied word is called a "critical lure." By and large, participants rated many of these critical lures as having been previously studied. Relevant to our discussion about memory and confidence is that, critical lures were frequently marked as old and also received high confidence ratings. A full 58% of the

critical lures were rated at the highest confidence level (a four) as having been previously studied. A large majority, 84%, of the critical lures were marked as having been studied. Clearly then, there are cases when, not only can memory be inaccurate, but individuals are highly confident in these inaccurate memories (see also Tulving, 1981; Brewer, Sampaio, & Barlow, 2005; Brewer & Sampaio, 2006; Brewer & Sampaio, 2012; Roediger & DeSoto, 2013).

Regulatory fit could affect confidence in falsely recognized items, such as in a DRM paradigm. As individuals are already fairly confident in their false recognitions, regulatory fit may increase this confidence even further. Interestingly though, because regulatory non-fit makes individuals feel more "wrong" about a target being evaluated, we might predict that it would make individuals *less* confident in their false recognitions as compared to regulatory fit. Reducing confidence in falsely recognized items may be of benefit. Confidence in memory can be assessed not only by simply asking individuals how confident they are, but also by asking individuals to predict (or post-dict) their performance on a memory test.

Memory predictions and post-dictions

Another form of memory confidence is that of memory predictions and post-dictions. In a standard paradigm, individuals are given information about an upcoming memory test, whether it be recall or recognition, and then asked to predict how well they will do on the memory test. Such a prediction is called a "global" prediction. After completing the memory test, participants may also be asked how they believe they performed on the memory test, called a "global" post-diction. Additionally, participants may be asked to rate how confident they are in their pre- and post-dictions. Although there are some exceptions, individuals are frequently overconfident in their performance predictions (e.g. Hacker, Bol, Horgan, & Rakow, 2000; Kruger & Dunning, 1999).

Various manipulations and interventions have attempted to influence individuals' global performance predictions (e.g. Kruger & Dunning, 1999; Miller & Geraci, 2014; Miller & Geraci, 2011b). Some interventions have been moderately successful in bringing performance and performance predictions closer together, but questions remain about whether these interventions could make judgments be based on one's knowledge of the tested material. Regulatory fit may serve as a possible intervention that affects global predictions.

In the present studies, I had several goals. One goal was to examine regulatory fit in the novel area of memory confidence. Finding consistent effects across literatures and paradigms strengthens the case for a particular theory. Given regulatory fit's effects in other literatures, I also expected that regulatory fit might be successfully used to alter people's test predictions. These studies were designed to test that prediction. The final and more notable goal of the present studies was to conduct a strong test of proposed regulatory fit mechanisms. Recall that regulatory fit has been hypothesized to engender a "feeling of rightness" and also makes individuals more confident in their judgments. By examining regulatory fit in memory confidence, I was able to directly test whether or not regulatory fit affects a variety of measures of memory confidence. Crucially, I also added a test of the feeling of rightness mechanism by asking individuals how right they felt. To my knowledge, only one study collected data that could have provided direct evidence for this feeling (Cesario et al., 2004). However, the authors did not report this data. The lack of direct evidence for an actual feeling of rightness is questionable, hence the reason for using a more direct test of regulatory fit theory.

How might traditional regulatory fit theory predict memory confidence should be affected by experiences of fit and non-fit? Under regulatory fit, if individuals feel more "right" about their memory ability, they may predict that they will perform better than when they are

under regulatory non-fit. Additionally, those under regulatory fit should be more confident in their predictions than those under non-fit. Confidence in predictions (or post-dictions) has been termed a "second order" judgment (e.g. Dunlosky, Serra, Matvey, & Rawson, 2005; Miller & Geraci, 2011a). After the memory test, individuals making post-dictions evaluate how well they believe they performed on the test and then indicate their confidence in that prediction. Under regulatory fit, they should feel more "right" about their memory performance and post-dict that they performed better compared to when under regulatory non-fit. Again, individuals should feel more confident under fit than non-fit about their post-dictions. Memory confidence and meta-memory judgments form two separate cases for the application of regulatory fit theory.

In Experiment 1, I examined whether regulatory fit influences memory performance and, in particular, memory confidence. In Experiment 1, I presented individuals with a list of unrelated words and asked them to judge how confident they were that each word was studied or unstudied. If the theory is correct, then those under regulatory fit should have "felt more right" about their memory ability than those under non-fit. I predicted that those under regulatory fit would show more confidence in their judgments than those under regulatory non-fit. In Experiment 2, I tested the hypothesis that people are more confident in false memories under regulatory fit than under non-fit by using a DRM memory paradigm. I predicted that people would feel more confident in their false memories when under regulatory fit as compared to non-fit. Experiment 3 tested whether regulatory fit affects performance predictions and, ultimately, whether regulatory fit could serve as a method of reducing meta-memory predictions. In Experiment 3, I examined global predictions and second-order judgments by asking participants to predict and later post-dict their performance on a recognition memory test. Participants also rated their confidence in these pre and post-dictions. I predicted that individuals under

regulatory fit as compared to non-fit would both pre- and post-dict greater memory performance and rate their confidence as higher in these two judgments. Experiment 4 explored the possibility that asking participants to make a memory judgment and confidence judgment within the same judgment may have affected results in the previous studies. For Experiment 4, I used the same materials as Experiment 1 and separated the memory judgment and confidence judgment into two separate judgments. I predicted that participants would be more confident in their memory judgments under fit as compared to non-fit.

CHAPTER II

EXPERIMENT 1

Experiment 1 tested whether regulatory fit affects people's confidence in their memory. Previous research has shown that regulatory fit increases confidence in evaluations (Cesario et al., 2004; Cesario, Higgins, & Scholer, 2008; Avnet et al., 2013) of a target message. The aim of Experiment 1 was to examine whether regulatory fit also affects memory confidence for accurate memories.

Participants were randomly assigned to a gains or losses version of a recognition memory test in which they rated their confidence in studied and unstudied items. In the gains version of the test, participants earned points for correct answers and on the losses version they lost points for incorrect answers. Their chronic regulatory focus was measured and their focus was compared with the task condition they were assigned to (gains or losses) to determine if they were under regulatory fit or non-fit. Pairing a gains or losses task with regulatory focus has been an adequate manipulation of regulatory fit and non-fit in non-memory paradigms (see Worthy, Maddox, & Markman, 2007; Otto, Markman, Gureckis, & Love, 2010; Maddox, Baldwin, & Markman, 2006; Markman, Maddox, Worthy, Baldwin, 2007 for examples). Participants were considered to be under regulatory fit if their predominate focus was promotion and they were in the gains condition or if their predominate focus was prevention and they were in the losses condition. Participants were considered to be under non-fit if their predominate focus was prevention and they were assigned to the gains condition or if their predominate focus was promotion and they were assigned to the losses condition. In line with previous research, I predicted that individuals would be more confident in their memories under regulatory fit as

compared to non-fit. Notably, I predicted that this would be true for words judged to be studied and unstudied as regulatory fit should affect confidence in any evaluation.

Method

Participants

One hundred and twenty undergraduates from the Texas A&M subject pool participated in this experiment. They received course credit in return for their participation.

Design

The study used a 2x2 between subjects factorial design. One independent variable was participants' chronic regulatory focus (promotion or prevention). The other independent variable was the reward structure of the memory test (gains or losses). Participants were randomly assigned to one of the two reward structures. Regulatory focus and reward structure were crossed to determine regulatory fit and non-fit conditions. The fit conditions were gains-promotion and losses-prevention. The non-fit conditions were gains-prevention and losses-promotion. To examine the effect of regulatory fit on confidence ratings, I conducted a 2x2 ANOVA on mean confidence ratings for items judged to be studied and items judged as unstudied. Secondarily, I analyzed memory performance in using a 2x2 ANOVA as the proportion of hits as regulatory fit may affect memory performance (Barber & Mather, 2013; Barber, Mather, & Gatz, 2015). The dependent variables were mean proportion of hits, mean confidence for items judged as studied and items judged as unstudied. I also conducted a 2X2 ANOVA with the dependent variables as mean confidence in items correctly judged as studied (hits), items incorrectly judged as studied (false alarms), items correctly judged as unstudied (correct rejections), and items incorrectly judged as unstudied (misses). I conducted two follow-

up t-tests comparing the effect of reward structure condition on the previously mentioned dependent variables.

Materials

Two study lists were created using word norms taken from Paivio, Yuille, and Madigan (1968) and Kucĕra and Francis (1967). The norms provide information on linguistic characteristics of a word as well as how it relates to other words in the English language. List order was counter-balanced so that half the participants received List A as the study list and half received List B as the study list. Words were chosen to be a maximum of 3 syllables in length and between 4-9 letters long. Words in both lists were matched on frequency, length, number of syllables, concreteness, imagery, and meaningfulness *p*'s > .330. Lists A and B consisted of 70 words each. Participants saw all of List A and B during the test phase. Regulatory focus was measured using the Regulatory Focus Questionnaire (RFQ; Higgins, Friedman, Harlow, Idson, Ayduk, & Taylor, 2001). This measure includes items such as "Growing up, would you ever 'cross the line' by doing things that your parents would not tolerate?"

I also included a manipulation check to determine if the reward structure and regulatory fit manipulations had an overt effect on behavior. To that end, I included a question that asked participants to what extent they used an eager strategy (on a scale from 1-5) during the memory test and a question that asked participants to what extent they used a vigilant strategy during the memory test. Gains and losses are intended to focus participant's attention on a particular type of environmental reward. This reward type should have an equivalent effect on the strategy participant's adopt during the task. For example, in a gains structured task, participants are rewarded for a hit, but receive no penalties for false alarms. This manipulation should have encouraged them to use a strategy that maximizes hits at the expense of a few more false alarms.

A losses structured task should have had the opposite effect. In a losses structured task, participants are penalized every time they make an incorrect response. This should have caused them to be more vigilant against false alarms and misses.

The feeling of rightness question (adapted from Cesario et al., 2004), asked participants to judge to what extent they felt right about their goal pursuit. If regulatory fit makes individuals "feel right", then we should have found that, compared to those under non-fit, participants under fit reported feeling higher levels of rightness about their goal pursuit. However, Cesario et al. did not report the results of this question in their article so we are left to wonder whether regulatory fit actually engenders a feeling of rightness or if some other internal state could account for the effects of regulatory fit. We included this question here as a check on whether regulatory fit truly engenders a feeling of rightness as compared to regulatory non-fit. Both the eager/vigilant questions and the feeling of rightness question can be found in the appendices.

Procedure

After giving informed consent, participants were asked to complete the regulatory focus questionnaire to be used as a measure of chronic regulatory focus. Next, they were given the instructions for the memory test. After reading the instructions, they began the study phase. Participants studied the randomly-chosen word list (either List A or List B). During the test and study phases, participants saw a word appear with a point value below it. The point values served as the reward structure manipulation with half of participants earning points for correct responses and half of participants losing points for incorrect responses. Each word-point pair appeared for 3 seconds and then the next pair appeared after a 200ms delay. After the study phase, participants were given instructions for the memory test.

Participants were told to indicate, on a scale from 1 to 4, how sure they were that a word was "new" or "old" with 1 being very sure the item was new and 4 being very sure the item was old. Participants were told that their goal was to maximize their total score at the end of the memory test and that they would see a constantly updating score as they answered "new" or "old." Participants saw the 70 studied words interleaved with 70 non-studied items during the memory test. Each "old or new" judgment was self-paced. Once all words were presented, the test phase ended and participants were given the eager/vigilant questions and the feeling of rightness question. At the end of the experiment session, participants were debriefed.

Experiment 1 Results

Significance (α) was set to .05 for all analyses. For the main analysis, I submitted mean memory confidence ratings to a Regulatory Focus (Promotion or Prevention) by Reward Structure (Gains or Losses) 2x2 ANOVA for each of the following: hits, false alarms, correct rejections, and misses. The predicted interaction between focus and reward structure was not supported for any of the four judgment types, F's < 1, nor was there a main effect of regulatory focus or reward structure on mean confidence ratings, p's > .290. Mean confidence for hits can be found in Figure 1 in Appendix B. Next, I analyzed memory performance as the proportion of total hits in the same above 2x2 ANOVA. Mean hits did not differ as a function of regulatory focus, $F < 1$, or as a function of task reward structure $F(1, 117) = 1.20$, $p = .276$. I also submitted mean number of false alarms, misses, and correct rejection proportions to the same 2x2 ANOVA. There was no effect of reward structure, regulatory focus, nor was there an interaction between the two for misses, p's > .200. However, there was an effect of reward structure on both false alarms ($F(1, 117) = 6.68$, $p = .011$) and correct rejections ($F(1, 117) = 7.25$, $p = .008$. Figure 2 demonstrates that participants in the gains condition had more false

alarms than those in the losses condition. Curiously, those in the gains condition did not also have more hits.

To understand why participants might have had more false alarms but not more hits in the gains condition than the losses condition, I also conducted a d' analysis. d' is a measure of sensitivity or the ability to tell distinguish between a studied item and a lure. d' scores were calculated for each participant and then submitted to the same 2x2 ANOVA as the main analyses. Results from this analysis showed a main effect of reward structure on d' scores, $F(1, 117) = 5.91$, $p = .017$, showing that participants in the losses condition ($M = 0.31$, $SD = 1.29$) were better at distinguishing between hits and false alarms than those in the gains condition ($M = -0.35$, $SD = 1.68$). There was not a main effect of regulatory focus nor an interaction between focus and reward structure, p's $> .270$.

Some research has used chronic regulatory focus as a continuous scale rather than using a median split (e.g. Cesario et al., 2004). I conducted the same analysis of memory confidence as above on hits, false alarms, correct rejections, and misses by entering the promotion minus prevention difference into a linear regression. In Block 1 reward structure (gains or losses) was entered as a predictor and in Block 2 the promotion minus prevention difference was entered to test for a potential interaction on mean memory confidence between reward structure and regulatory focus scores. None of the models for the various types of mean memory judgments using reward structure (gains or losses) were significant, F's < 1, nor were the models for the interaction terms between reward structure and regulatory focus score significant, F's < 1.

It is possible that the previous analyses did not show differences between regulatory fit conditions on mean memory confidence because participants answered the regulatory focus questionnaire by responding with values in the middle of the scale, reducing potential variability.

Perhaps only those with higher or lower regulatory focus scores experienced a strong enough regulatory fit or non-fit to affect their memory confidence. To test this hypothesis, I removed 16 individuals who scored in the middle of the regulatory focus scale, 8 above and 8 below the median. Ideally, more extreme groups would be created, but I chose to exclude 16 to retain a reasonable amount of power given that there are roughly 30 participants per cell before any exclusions. These exclusions resulted in 26 individuals in the two gains conditions, 25 in the prevention-losses condition, and 27 in the promotion-losses condition. After these exclusions, I conducted the same analyses on mean confidence in hits, false alarms, correct rejections, and misses as the main analysis using a 2x2 ANOVA (Regulatory Focus X Reward Structure). There were no main effects of reward structure or regulatory focus on mean confidence dependent variables, p's > .240, nor were there any interactions between reward structure and regulatory focus p's > .500. This analysis provides no indication that regulatory fit affects memory confidence.

Mean confidence across all fit groups was relatively high. It is possible that only those individuals who did poorly on the memory test experienced variability in their memory confidence across items. To examine this possibility and how regulatory fit might have affected these individuals' judgments, I selected only those participants who had lower than 80% corrected hit rate. This eliminated the highest performers from the analyses. I then conducted the same 2x2 main analysis on memory confidence in hits, false alarms, correct rejections, and misses using the lower performing subgroup. Using this subgroup, again, results show that there was no main effect of reward structure or regulatory focus, nor an interaction between the two for mean confidence in hits, F's < 1. For mean confidence in false alarms, there was no significant main effect of reward structure, $F(1, 82) = 2.38$, $p = .127$, although individuals in the

gains conditions had numerically higher confidence ratings (M = 3.65, SD = 0.33) than those in the losses conditions (M = 3.53, SD = 0.43). However, there was no main effect of regulatory focus, nor was there an interaction between focus and reward structure, p's > .280. There was no main effect of reward structure on confidence in correct rejections, $F < 1$. There was, however, an indication that regulatory focus might affect confidence in correct rejections, $F(1, 82) = 2.88$, $p = .094$. Promotion focused participants were more confident in their correct rejections (M = 1.49, SD = 0.35) than prevention focused participants (M = 1.37, SD = 0.34). Lastly, there was no main effect of reward structure or regulatory focus on mean confidence in misses, p's > .270, nor was there an interaction between the two independent variables, $F < 1$.

As a final analysis on the memory related data from Experiment 1, I examined reaction times during the memory test. Some research suggests that relative to non-fit, regulatory fit may result in more fluent processing of information related to a previous evaluation (Lee & Aaker, 2004). On a memory test, this could mean that individuals who studied the list under fit responded more quickly to these items during the test. Or, they could respond to all items more quickly on the test as compared to those under non-fit. I analyzed mean reaction times to studied items and to filler items in the same 2x2 ANOVA as the main analyses. There was no main effect of reward structure, regulatory focus, nor an interaction between the two independent variables on either mean reaction times for studied items or filler items, p's > .290.

If regulatory fit indeed instantiates a feeling of rightness, then participants should be expected to report feeling more right under fit than non-fit. Mean feeling of rightness scores were submitted to the Regulatory Focus by Reward Structure 2x2 ANOVA. I found no interaction between regulatory focus and reward structure on mean feeling of rightness $F < 1$.

I also wanted to determine if participants were consciously aware of the response strategy they should choose based on the task reward structure. In other words, participants should respond with a more eager approach in the gains condition and be more likely to say words were studied, even if they aren't completely sure. Those in the losses condition should be more vigilant against false alarms in order to avoid losing points. Mean eager/vigilant question responses (scale from 1-5) were submitted to an independent t-test with the goal of determining whether the task reward structure affected participants' goal pursuit mindset. Means on the eager/vigilant questions did not differ as a function of task reward structure, *t*'s < 1.

To summarize, I examined the effect of regulatory fit on memory performance, memory confidence, and a feeling of rightness. None of the analyses provided any evidence that regulatory fit affects memory performance or memory confidence. There was also no evidence that regulatory fit engenders a feeling of rightness. I had predicted, using regulatory fit theory, that memory confidence should be greater under fit than non-fit and that fit should engender a feeling of rightness. The results of Experiment 1 do not support any of these predictions and do not support regulatory fit theory as it is currently formulated.

CHAPTER III

EXPERIMENT 2

Whereas Experiment 1 examined whether regulatory fit influenced people's confidence for accurate memories, Experiment 2 examined whether regulatory fit influenced their confidence in false memories. Experiment 2 employed the DRM paradigm (Roediger & McDermott, 1995) in which participants studied lists of related words and took a recognition memory test. This experiment examined whether regulatory fit increased confidence in false memories as compared to non-fit.

Experiments 1 and 2, together, form a test of the effects of regulatory fit on confidence for two kinds of memories-true and false. Like Experiment 1, Experiment 2 was designed to measure memory confidence at the item level. That is, participants were asked to judge their memory confidence for a particular item judgment, as opposed to asking for confidence in multiple items or the test overall. Also similar to Experiment 1, in Experiment 2 I used an integral manipulation of regulatory fit. An integral manipulation of regulatory fit is a manipulation within the task itself rather than on a task that occurs prior to the administration of the dependent variable. For example, by rewarding participants in Experiment 1 with points on the memory test in the gains condition, or by taking away points in the losses condition, the task itself manipulates regulatory fit, i.e. an integral manipulation. A free response essay to manipulate regulatory fit before a task is an example of an incidental manipulation. By sharing such features as the kind of regulatory fit manipulation and the level of confidence assessed, we can be more certain of the effects of regulatory fit on accurate and false memory confidence.

Participants were randomly assigned to a gains or losses version of a recognition memory test in which they rated how confident they were an item was studied or unstudied. Their

chronic regulatory focus was also measured to determine whether they were under regulatory fit or non-fit. They studied a list of words, some of which were related to non-presented critical lures. Recall that a critical lure is a word related to all the other words in a set but is not presented in the study list. Participants frequently indicate that critical lures were actually studied items (e.g. Roediger & McDermott, 1995). I predicted that participants under regulatory fit would be more confident in their memories of studied items and in critical lures as compared to those under non-fit.

Method

Participants

I recruited 125 participants from the undergraduate SONA subject pool at Texas A&M University. They received course credit in return for their participation.

Design

The study used a 2x2 between subjects factorial design. One independent variable was participants' chronic regulatory focus (promotion or prevention). The other independent variable was the reward structure of the memory test (gains or losses). Participants were randomly assigned to one of the two reward structures. Regulatory focus and reward structure were crossed to determine regulatory fit and non-fit conditions. The fit conditions were gains-promotion and losses-prevention. The non-fit conditions were gains-prevention and losses-promotion. I conducted a 2x2 ANOVA on confidence ratings for items judged to be studied including both critical lures and actually studied words. The dependent variable in these two analyses was mean confidence ratings in hits and mean confidence ratings in false alarms to critical lures. Secondarily, I examined whether regulatory fit affected the proportion of critical lures and studied items participants mark as studied in the same 2x2 ANOVA. Here, the

proportion of critical lures marked "old" and studied items marked "old" served as the dependent variables.

Materials

The studied word list was taken from Roediger and McDermott (1995). There were 6 critical lures with a set of 12 associated words for each lure. None of the lures were on the study list. The total number of words in the study list was 72. As in Roediger and McDermott, the test list consisted of 12 studied items, the 6 critical lures, 12 words unrelated to any of the list words, and 12 words weakly related to each associate list for a total of 42 words. Each word, filler item, and critical lure was paired with a number for the purposes of creating a reward structure for the memory test. Participants answered questions from the RFQ to measure their chronic regulatory focus (Higgins et al., 2001). The eager/vigilant questions and the feeling of rightness question were used as in Experiment 1.

Procedure

Experiment 2 followed the same general procedure as Experiment 1. After giving consent, participants were asked to complete the regulatory focus questionnaire to be used as a measure of chronic regulatory focus. Next, they were told the instructions for the memory test. After reading the instructions, they began the study phase. As in Experiment 1, participants saw a point value paired with a word for the gains and losses reward structure manipulation. Participants studied each word for 1.5 seconds after which the next word appeared after a 200ms delay. After the study phase, participants began the memory test phase. Participants were told to indicate on a scale from 1 to 4 how sure they were that a word was "new" or "old" with 1 being very sure new and 4 being very sure old. Participants were told that their goal is to maximize their total score at the end of the memory test and they would see a constantly updating score as

they answered "new" or "old." Each "old or new" judgment will be self-paced. Once all words were presented, the test phase ended and participants completed the eager/vigilant questions and the feeling of rightness question. Following that, they were debriefed.

Experiment 2 Results

Significance (α) was set to .05 for all analyses. I first submitted mean memory confidence ratings to a Regulatory Focus (Promotion or Prevention) by Reward Structure (Gains or Losses) 2x2 ANOVA for hits and critical lures. The predicted interaction between focus and reward structure was not supported for mean confidence in hits, $F(1, 121) = 1.68$, $p = .971$. Results also showed no significant main effect of reward structure on mean confidence ratings in hits, $F < 1$. The main effect of regulatory focus approached significance, $F(1, 121) = 3.46$, $p = .065$. Results for mean confidence in critical lures showed no significant main effect of reward structure or regulatory focus, p's > .500, nor was the predicted interaction significant, $F(1, 121) = 1.14$, $p = .287$. Mean confidence for hits and critical lures can be can be found in Figures 4 and 5, respectively, in Appendix B.

Next, I analyzed memory performance as the proportion of total hits and the proportion of critical lures in the same above 2x2 ANOVA. For mean proportion of total hits, results showed no significant main effect of reward structure or regulatory focus, F's > .400. There was also no significant interaction between reward structure and regulatory focus, $F < 1$. Results for mean proportion of critical lures showed no significant main effects of reward structure or regulatory focus F's < 1. There was also no significant interaction between reward structure and regulatory focus, $F(1, 121) = 2.73$, $p = .101$. Mean proportion of critical hits can be found in Figure 6 in Appendix B.

Finally, I conducted the secondary analyses on the eager/vigilant questionnaires and the feeling of rightness questionnaire. Results for mean feeling of rightness responses showed a significant main effect of reward structure on feeling of rightness, $F(1, 121) = 11.78$, $p = .001$, such that participants in the gains condition ($M = 3.75$, $SD = 0.72$) felt more right than those in the losses condition ($M = 3.27$, $SD = 0.83$). There was no significant main effect of regulatory focus, nor was there a significant interaction, p's $> .260$. Results for the mean vigilant question responses showed no significant main effects of reward structure or regulatory focus, nor was there was a significant interaction p's $> .170$. Results for mean eager question responses showed no significant main effect of regulatory focus, $F(1, 121) = 1.78$, $p = .185$, and no significant main effect of reward structure, $F(1, 121) = 2.58$, $p = .111$. There was, however, a significant interaction between reward structure and regulatory focus on mean eager question responses, $F(1, 121) = 4.43$, $p = .037$. To examine the nature of this interaction, I conducted two t-tests within each regulatory focus (promotion or prevention). Mean eager question responses were compared for promotion-gains and promotion-losses in one test, and mean eager question responses were compared for prevention-gains and prevention-losses in the other test. Participants under a prevention focus did not report significantly different mean eager responses depending on their reward structure assignment, $t < 1$. Participants under a promotion focus reported using significantly more eager response strategies in the losses condition ($M = 2.97$, $SD = 0.98$) than those in the gains condition ($M = 2.26$, $SD = 1.26$), $t(62) = 2.52$, $p = .014$. Based on the results of this question from Experiment 1 and the fact that this is inconsistent with the kind of strategy a losses reward structure should induce, this is likely an anomaly.

The results from Experiment 2 suggest that regulatory fit does not affect confidence in false memories or memory performance. Experiment 2 also provided evidence that a feeling of rightness may not be the mechanism of action when people are under regulatory fit.

CHAPTER IV

EXPERIMENT 3

Experiment 3 was also designed to examine the potential effects of regulatory fit on memory confidence. However, in contrast to the previous two experiments, in Experiment 3 memory confidence was assessed using a different method. The previous experiments used a regulatory fit paradigm that allows one to examine confidence ratings during a memory test. Fit was manipulated during the test itself, an integral manipulation. Experiment 3 used an incidental manipulation of regulatory fit, allowing me to test the effects of regulatory fit on memory pre and post-dictions. Additionally, Experiments 1 and 2 tested the effects of regulatory fit and non-fit on item level confidence ratings, whereas Experiment 3 examined global confidence ratings in the form of global pre and post dictions. Finally, Experiment 3 also provided an additional test of regulatory fit theory. Recall that regulatory fit is hypothesized to engender a feeling of rightness in an individual and that this affects their evaluations of a target. This theory also predicts that confidence in an evaluation is increased under regulatory fit compared to non-fit. In Experiment 3, global pre and post-dictions served as the evaluation, and we also measured confidence in that evaluation in the form of second order meta-memory judgments. A second order judgment, is an assessment of how confident people are in their global pre and post-dictions. Regulatory fit theory would predict that people under fit would both predict (and post-dict) higher scores on the memory test *and* be more confident in this prediction (and post-diction).

In Experiment 3, participants were randomly assigned to an incidental regulatory fit manipulation condition. To manipulate regulatory focus (promotion or prevention) and means of goal pursuit (eager or vigilant), participants were asked to write about either a hope or aspiration

(promotion) or duty or obligation (prevention) and use either eager or vigilant strategies to detail how they might obtain this aspiration or fulfill this duty. Then they were asked to make predictions and confidence ratings about an upcoming memory test, after which they made post-dictions and confidence ratings. I predicted that participants in the regulatory fit conditions would both pre and post-dict greater memory performance and have higher confidence in those judgments than those under non-fit.

Method

Participants

I recruited 124 participants from the undergraduate SONA subject pool at Texas A&M University. They received course credit in return for their participation.

Design

The study used a 2x2 between subjects factorial design. One independent variable was regulatory focus (promotion or prevention; randomly assigned). The other variable was whether participants were to list eager or vigilant means to obtain their goal. The dependent variables were mean global prediction, mean confidence in global prediction, mean global post-diction, and mean confidence in global post-diction. Secondarily, I also submitted mean proportion of hits to the 2x2 ANOVA.

Materials

The same study list used in Experiment 1 was used in Experiment 3. To manipulate regulatory fit, participants wrote an essay in which they described their hopes and aspirations or they completed an essay in which they described their duties or obligations (Freitas & Higgins, 2002). After listing a hope or aspiration (or duty or obligation), participants were instructed to list several means they could use to fulfill that duty or realize that aspiration. Means were either

be eager or vigilant. The consumer opinions survey was constructed based on Vaughn and colleagues (2006). The purpose of the consumer choices questionnaire is to add a short filler task between the fit manipulation and the beginning of the memory judgments. Vaughn et al. found evidence that participants would sometimes discount the regulatory fit experience and that using a short filler interval on an unrelated task better allowed them to detect the effects of regulatory fit. The feeling of rightness question and eager/vigilant question were used as in Experiments 1 and 2.

Procedure

After consenting to participate in the study, participants were informed that they were taking part in an experiment examining the relationship between goals and consumer opinions, whereas the second part of the experiment was concerned with memory performance. This minor deception was needed so that participants did not connect the regulatory fit manipulation with the memory test, which could have altered their judgments.

First, participants were asked to complete the incidental regulatory fit manipulation questionnaire (Freitas and Higgins, 2002). After this they were given the consumer choices questionnaire (Vaughn et al., 2006). After completing the consumer choices questionnaire, participants studied 70 words for a multiple choice memory test. Before studying the words for the test, they were asked to predict how many words they believed they would correctly recognize on the upcoming memory test. Following the global prediction, they indicated how confident they were in that prediction on a scale from 1 to 5 with 1 being not confident at all and 5 being extremely confident.

After the global predictions, participants studied the 70 words at a presentation rate of one word every 2 seconds. After the study phase, they proceeded immediately to the test phase.

Participants marked each word they saw as "old" or "new." The 70 studied words were shown along with 70 non-studied words in a random order. After the test phase, participants answered the post-diction questions. They were asked to post-dict how many words they believed they correctly remembered and rate how confident they were in that judgment on the same 1 to 5 scale as the prediction. Following this, they answered the eager/vigilant questions and the feeling of rightness item. Finally, they were be debriefed.

Experiment 3 Results

Significance (α) was set to .05 for all analyses. For the main analysis, I submitted mean prediction, mean post-dictions, and confidence in pre and post-dictions to a Regulatory Focus (Promotion or Prevention) by Means of Goal Pursuit (Eager or Vigilant) 2x2 ANOVA. Mean global predictions (Figure 7) did not differ as a function of regulatory focus or means of goal pursuit, nor was there an interaction between the two, *F*'s < 1. Mean global prediction confidence (Figure 8) differed significantly as a function of regulatory focus, with participants in the prevention condition ($M = 3.24$, $SD = 0.78$) being more confident in their predictions than those in the promotion condition ($M = 2.95$, $SD = 0.81$). Prediction confidence ratings did not differ as a function of means of goal pursuit, $F < 1$, nor was there an interaction between the two $F = 1.96$, $p = .123$.

Mean global post-dictions (Figure 9) did not significantly differ as a function of regulatory focus, $F(1, 120) = 2.76$, $p = .100$, or means of goal pursuit, $F < 1$. However, there was a significant interaction between means of goal pursuit and reward structure on post-dictions (Figure 7), $F(1, 120) = 8.28$, $p = .005$. As planned, I conducted a t-test on mean post-dictions within each regulatory focus type. For promotion focus, participants in the eager condition ($M = 26.19$, $SD = 7.84$) post-dicted that they remembered more words than those in the vigilant

condition (M = 20.90, SD = 7.44), $t(59) = 2.70$, $p = .009$. For prevention focus, participants in the vigilant condition (M = 27.68, SD = 9.96) numerically post-dicted that they remembered more words than those in the eager condition (M = 24.38, SD = 7.77), but this comparison was not significant, $t(61) = 1.47$, $p = .147$. For mean post-diction confidence, there was not a significant effect of regulatory focus, $F(1, 120) = 1.99$, $p = .161$, means of goal pursuit, $F < 1$, nor an interaction between the two independent variables, $F(1, 120) = 2.26$, $p = .136$.

One might wonder if the reason that participants under regulatory fit believed they did better on the memory test than those under non-fit is because they *actually did* perform better. To answer this question, I analyzed hits, corrected hit rate, and false alarms. I submitted each of these dependent variables to the same 2x2 ANOVA as the other analyses (Regulatory Focus X Means of Goal Pursuit). Total number of hits did not differ as a function of means of goal pursuit, regulatory focus, nor was there an interaction between the two, p's > .170. Next, I calculated corrected hit rate by subtracting total hits from false alarms and dividing by the total number of studied items. This was submitted to the 2x2 ANVOA. There was no effect of means of goal pursuit or regulatory focus on corrected hit rate (Figure 11), p's > .160, nor was there an interaction between the two independent variables, $F<1$. Finally, I analyzed false alarms. Participants did not differ on false alarms as a function of means of goal pursuit or regulatory focus, F's<1, nor was there an interaction between the two independent variables, $F(1, 119) = 2.67$, $p = .105$.

For the next set of analyses, I examined the eager/vigilant questions along with the feeling of rightness question. For the vigilant question, low scores were participants reporting that they did not care about false alarms much and high scores indicated participants tried to have fewer false alarms. There was no effect of regulatory focus, means of goal pursuit, nor an

interaction between the two independent variables on mean responses, *p*'s > .280. For the eager question low scores indicated less eager strategy use and high scores indicated more eager strategy use. There was no effect of regulatory focus, means of goal pursuit, nor an interaction between the two independent variables on mean responses, *p*'s > .220. Finally, I examined the feeling of rightness question. Higher scores indicated feeling "more right." There was no effect of regulatory focus, means of goal pursuit, nor an interaction between the two independent variables on mean feeling of rightness responses, *p's* > .158.

I examined whether regulatory fit affected global predictions, post-dictions, and confidence in each of those judgments. I also examined whether regulatory fit engendered a feeling of rightness. Regulatory fit did not affect second order judgments or global predictions, however, it did affect global post-dictions. Participants in the promotion-eager fit condition post-dicted that they performed better on the memory test than participants in the promotion-vigilant non-fit condition. Participants in the prevention-vigilant fit condition also post-dicted that they performed better on the memory test than participants in the prevention-eager condition, but this comparison was not significant. These results suggest that regulatory fit may cause people to believe they performed better on a memory test than when they are under regulatory non-fit. There was, however, no evidence that regulatory fit engendered a feeling of rightness as measured in Experiment 3.

CHAPTER V

EXPERIMENT 4

It is possible that the experimental design in Experiments 1-3 may have affected the results. In particular, participants were asked during the memory test to indicate their "old-new" judgment at the same time as their confidence judgment. Some might suggest that a memory judgment is dependent largely on mental processes that could include access to mnemonic information. It is unclear how or if a feeling of rightness (that leads to greater confidence) might at all affect a memory judgment. Thus, it is possible that having participants make their confidence and memory judgments at the same time might have contaminated the confidence judgment with memory judgment information and muted potential effects.

The type of judgment used may have also contributed to a muting of the feeling of rightness. When participants made their judgments the variability of response possibility was significantly truncated. The scale itself was a 1-4 scale, but only numbers 1 and 2 corresponded to new judgments and numbers 3 and 4 corresponded to old judgments. If feeling right is a small effect, it may not have been enough to shift participant judgments from a 3 to a 4 or from a 2 to a 1, for example.

Lastly, what participants were required to do on the memory test may have been too difficult such that it interfered with a feeling of rightness. In addition to making both a memory judgment and a confidence judgment simultaneously, participants also needed to place their attention on the point value of a word and keep track of their total points as they updated throughout the memory test.

To address these possible concerns, we altered the memory test procedure and our memory confidence scale in Experiment 4. We separated the "old-new" judgment and the

confidence so that participants made the "old-new" judgment first, then made the confidence judgment. The confidence judgment scale was changed to a 1 to 8 scale to provide more opportunity for variability in participant responses.

We also changed the way we measured the feeling of rightness In the previous experiment, some participants asked experimenters what the question meant by their thoughts and actions aligning (see Appendix A for feeling of rightness question version 1). We wondered if participants understood what the question asked. To help participants answer the feeling of rightness question, we added a description of a time they were likely to have "felt right." In particular, we told participants to think of a time when they might have felt right, such as when they made a decision they knew would be most proper for them. We hoped that by helping participants connect with what feeling right would be like that they would be better able to answer the rightness question.

We predicted that with the changes to the experimental procedure participants under regulatory fit would indicate feeling more right than those under non-fit. We also predicted that participants would be more confident in "old-new" memory judgments under regulatory fit than under non-fit.

Method

Participants

One hundred and forty six undergraduates from the Texas A&M subject pool participated in this experiment. They received course credit in return for their participation. Nine participants were excluded from all analyses due to rapidly making the same responses for all trials (i.e. having a 1 or 2 on both all "old-new" judgments and all confidence judgments).

Design

The study used the same 2x2 between subjects factorial design as the previous experiments. One independent variable was participants' chronic regulatory focus (promotion or prevention). The other independent variable was the reward structure of the memory test (gains or losses). Participants were randomly assigned to one of the two reward structures. Regulatory focus and reward structure were crossed to determine regulatory fit and non-fit conditions. The fit conditions were gains-promotion and losses-prevention. The non-fit conditions were gains-prevention and losses-promotion. To examine the effect of regulatory fit on confidence ratings, I conducted a 2x2 ANOVA on mean confidence ratings for hits, misses, correct rejections, and false alarms. Secondarily, I analyzed memory performance in using a 2x2 ANOVA as the proportion of corrected hits. The dependent variables were mean number of hits, misses, correct rejections, and false alarms, and mean confidence for the same judgment types.

Materials

The same two study lists as used in Experiment 1 were used in Experiment 4 (1-3 syllable long words, 4-9 letters in length with lists matched on frequency, length, number of syllables, concreteness, imagery, and meaningfulness). Regulatory focus was again measured using the Regulatory Focus Questionnaire (RFQ; Higgins, Friedman, Harlow, Idson, Ayduk, & Taylor, 2001).

The feeling of rightness question (adapted from Cesario et al., 2004), asked participants to judge to what extent they felt right about their goal pursuit. We altered the questionnaire to include an example of what feeling right might be like due to questions about what the questionnaire was referring to. The altered questionnaire can be found in the appendix (Feeling of Rightness Question Version 2).

Procedure

After giving informed consent, participants were asked to complete the regulatory focus questionnaire to be used as a measure of chronic regulatory focus. Next, they were given the instructions for the memory test. After reading the instructions, they began the study phase. Participants studied the randomly-chosen word list (either List A or List B). During the test and study phases, participants saw a word appear with a point value below it. The point values served as the reward structure manipulation with half of participants earning points for correct responses and half of participants losing points for incorrect responses. Each word-point pair appeared for 3 seconds and then the next pair appeared after a 200ms delay. After the study phase, participants were given instructions for the memory test.

Participants were told to indicate whether they believed a word was "new" or "old." After indicating whether they believed a word was "new" or "old" we asked participants how confident they were in that judgment on a scale from 1 to 8. Participants read that their goal was to maximize their total score at the end of the memory test and that they would see a constantly updating score as they answered "new" or "old." Participants saw the 70 studied words interleaved with 70 non-studied items during the memory test. Each "old or new" judgment was self-paced. Once all words were presented, the test phase ended and participants were given the feeling of rightness question. At the end of the experiment session, participants were debriefed.

Experiment 4 Results

Significance (α) was set to .05 for all analyses. For the main analysis, I submitted mean memory confidence responses to a Regulatory Focus (Promotion or Prevention) by Reward Structure (Gains or Losses) 2x2 ANOVA. Separate analyses were conducted on mean memory

confidence in hits, false alarms, correct rejections, and misses. The interaction between regulatory focus and reward structure was not significant for hits $F < 1$, misses $F < 1$, correct rejections ($F(1, 133) = 1.31$, $p = .255$), or false alarms ($F(1, 133) = 1.33$, $p = .250$). The main effects of reward structure and regulatory focus were also not significant on mean memory confidence in hits, false alarms, misses, or correct rejections (*p's* > .350 and *p*'s > .170 respectively). We also examined memory performance. Mean total hits and mean proportion corrected hit rate were submitted to the same Regulatory Focus by Reward Structure 2x2 ANOVA. The interaction between regulatory focus and reward structure was not supported for either total hits or corrected hits, *F*'s < 1. There was also no support for main effects of regulatory focus or reward structure (*p*'s > .170 and *p*'s > .300 respectively). Figures depicting mean confidence in hits (Figure 12) and mean number of hits (Figure 13) can be found in Appendix B.

Lastly, we examined if there was any direct evidence for a feeling of rightness. We examined the effect of Regulatory Focus and Reward Structure using a 2x2 ANOVA on mean feeling of rightness ratings. Note that one participant did not fill out the back page of the RFQ and so was not included in the feeling of rightness analysis. The predicted interaction between regulatory focus and reward structure was not supported $F(1, 132) = 1.47$, $p = .228$. We did not find a significant main effect of regulatory focus on feeling of rightness ($F < 1$), but we did find a main effect of reward structure on mean feeling of rightness responses, $F(1, 132) = 9.26$, $p = .003$, with participants in the gains condition ($M = 3.51$, $SD = 0.64$) feeling more right than those in the losses condition ($M = 3.16$, $SD = .075$). A graphical representation of mean feeling of rightness responses can be found in Figure 14 in Appendix B.

After altering our methodology slightly, we were still unable to find evidence supporting the predictions that participants under regulatory fit, as compared to non-fit, would be more confident in their memory. We also failed to find evidence that participants under regulatory fit would feel more right than those under non-fit. In fact, we found a main effect of reward structure with participants feeling more right in the gains condition than in the losses condition. We did not find this in any of the other experiments, so it is likely because of the changes in the questionnaire wording.

CHAPTER VI

CONCLUSION

Across four experiments, I tested a proposed regulatory fit mechanism in the novel area of memory. Experiment 1 examined whether or not regulatory fit engendered a subjective feeling of rightness as assessed using item-level memory confidence ratings. I predicted that participants under regulatory fit would have higher levels of mean confidence than those under non-fit and would feel more right than those under non-fit. However, the results did not support this prediction. There was no effect of regulatory fit on memory confidence judgments, memory performance, or the feeling of rightness questionnaire in Experiment 1.

Experiment 2 examined the effect of regulatory fit on false memory confidence judgments. I predicted that regulatory fit would make individuals feel more right than those under non-fit and that they would have higher levels of confidence in false memory critical items than those under non-fit. No predictions were supported by the results. Confidence in false memories was not affected by regulatory fit. Additionally, there was no effect of regulatory fit on accurate memory performance or endorsement of critical lures in Experiment 2. Experiments 1 and 2 together failed to provide evidence that regulatory fit affects memory performance in younger adults.

Experiment 3 also examined the effect of regulatory fit on memory confidence. This study took a different approach to assessing memory confidence than Experiments 1 and 2. Experiment 3 examined memory confidence in the form of global predictions, post-dictions, and second order judgments. I predicted that individuals under regulatory fit would feel more right than those under non-fit. I also predicted that those under regulatory fit would have higher global predictions and post-dictions than those under non-fit and be more confident than those

under non-fit in both global judgments. The results only partially supported these predictions. Individuals under regulatory fit in the prevention-vigilant condition believed they had done better on the memory test (greater mean postdictions) than those in the non-fit prevention-gains condition. The promotion-eager and promotion-vigilant conditions had numerically the same pattern, with participants in the promotion-eager condition believing they had done better on the memory test than those in the promotion-vigilant condition. Importantly, the interaction between regulatory focus and reward structure was also significant. Again however, the predictions about the effect of regulatory fit on global predictions and second order judgments were not supported. In other words, there was no effect of regulatory fit on global predictions or second order judgments. Participants also did not differ as a function of regulatory fit on the feeling of rightness question in Experiment 3.

Experiment 4 modified the experimental procedure by separating the "old-new" judgments and the memory confidence judgment. The feeling of rightness questionnaire was also modified to make the question more understandable for participants. I predicted that individuals would report feeling more right under fit than non-fit and that they would report greater levels of confidence in their memory under fit than non-fit. Neither of these predictions were supported.

Each experiment in this dissertation was a unique test of the hypothesized effect of regulatory fit on memory and memory confidence. These experiments directly assessed the hypothesis that regulatory fit leads to a feeling of rightness, as measured by confidence judgments and second-order confidence judgments. These experiments also investigated whether participants felt more right in their goal pursuit under regulatory fit than non-fit. The fact that memory confidence only appeared greater in the form of a global post-diction and that

individuals did not report feeling more right raises some questions about the theory that regulatory fit leads to a feeling of rightness, which affects judgments.

One interpretation of these results is that the proposed mechanism of a feeling of rightness has important boundary conditions not delineated within the extant literature. Recall that regulatory fit supposedly instantiates a feeling of rightness, which individuals misinterpret as relevant information to a judgment. Additionally, the literature suggests that individuals become more confident in their judgments under certain conditions (see Cesario et al., 2004 and Avnet, Laufer, & Higgins, 2013). Perhaps necessary boundary conditions for an effect of feeling right includes additional characteristics about the attitude the judgment is about.

In particular, perhaps item level memory confidence is not affected by regulatory fit because these judgments are about attitudes that are not sufficiently malleable as compared to more common regulatory fit attitudes found in the literature. Consider the typical procedure used in some of the cited studies. An individual might be asked to read a persuasive statement about a new university policy. The university policy is a hypothetical and likely about a topic participants haven't spent much time thinking about. Other experiments might assess participant attitudes about a hypothetical (or real) product they are unlikely to have developed a strong opinion about. Attitudes that are mostly unformed or solidified might be relatively malleable in the sense that have yet to take shape. In these two examples, participants make relevant judgments and solidify their attitudes directly under the influence of regulatory fit or non-fit. In contrast, memory confidence judgments may differ in terms of malleability from more typical methods in the regulatory fit literature. For example, individuals have a lot of experience judging their confidence in their memory and such judgments may as a result be less malleable.

Additionally, some memory confidence judgments made during a task may not be based on a "feeling" of whether or not someone feels right about their judgment, but rather on memory processes (in one view) or the strength of a memory trace (in another view). In particular, sometimes when participants made memory judgments, they may have had access to mnemonic information, which might significantly bias their response. The presence of mnemonic information during retrieval has been identified by individuals using the remember-know paradigm, in which participants indicate if they can recall episodic details along with their memory judgment (Gardiner, Ramponi, & Richardson-Klavehn, 2002; Rajaram, 1993; Rajaram, 1996; Roediger, Rajaram, & Geraci, 2007). The presence of episodic information on a given trial may heavily bias participants' confidence ratings. When participants are allowed full attention to a task, the vast majority of their remember judgments, when rated for confidence, use the maximum number on the given scale. Know judgments, on the other hand, have more variability in confidence of response (Yonelinas, 2001). Participant performance was not high enough for them to have recalled episodic information on all hit trials, but may have been on a large enough subset to have muted an effect of regulatory fit on their confidence judgments.

If it is the case that regulatory fit can only affect an attitudinal judgment when it is sufficiently malleable, global memory predictions do not fit this criterion well. When people are asked to predict how well they believe they will perform on a memory test, several factors can influence their predictions, some internal and some external. Internal factors include things such as memory self-efficacy (MSE), which is correlated with memory predictions (see Beaudoin & Desrichard, 2011 for a meta-memory meta-analysis) or the extent of people's knowledge about their memory ability (Bunnell et al., 1999). External factors can include such things as the type of processing individuals are asked to perform (Bieman-Copland & Charness, 1994) or

knowledge about the memory test itself (Seelye, Schmitter-Edgecombe, & Flores, 2010). The internal factors, MSE and memory ability knowledge, are not components that are easily shifted. Self-efficacy, in particular, is based on the history of success and failure in real life which can accumulate over years or even decades (Bandura, 1977). As such, a global memory prediction may be less malleable than traditional judgment types used in regulatory fit studies.

There are some limitations to the present experiments. For example, in applying regulatory fit to the novel area of memory, these experiments may have been underpowered. Generally, regulatory fit studies use 25-35 participants per cell, but perhaps any effect on memory confidence is smaller and would require more participants to detect. A different but also statistical limitation may result from participant ratings on our confidence scales. Across Experiments, participants' average confidence in their judgments is high, especially for hits (see Figures 1 and 12). It is possible that ratings were high enough to be at ceiling. If this were the case and regulatory fit should make people more confident, being at ceiling would have placed an upper limit on how much more confident participants could become. Another potential limitation is that I used the regulatory focus questionnaire as a means of determining current regulatory focus. Though this procedure has been used successfully in previous studies, there are methodologically stronger manipulations of regulatory fit (see Motyka et al., 2014 for a meta-analysis). Related to this may be that participants were gained or lost points instead of pleasure and pain that was more visceral or real to them. For example, we might have given or taken away real money during the course of the task instead of using points.

The manner in which I assessed a feeling of rightness may have also served as a limitation in these studies. A feeling of rightness could be the mechanism of action in regulatory fit, or it might be something else. The fact that I did not find an effect of regulatory fit on feeling

of rightness using the current questionnaire does not necessarily indicate that the feeling of rightness is not the mechanism of action. If one reads the feeling of rightness question, presented in Appendix B, it is possible that the wording of the question may be incomprehensible to the average 18 year old participant. We attempted to rectify this by providing participants with an example of what feeling right might be like, but still failed to find an effect of regulatory fit on this rephrased questionnaire (see Experiment 4). To investigate what the mechanism of action might be, future research could simplify the language in the feeling of rightness questionnaire in a way that participants might be able to more easily understand, or it could provide participants with a different example of feeling right. Future research could also investigate other potential mechanisms. Also note that the manipulation of regulatory fit I used involved the regulatory focus questionnaire, which may have not been a strong enough manipulation to result in an effect on the feeling of rightness measure.

An alternative to the proposed regulatory fit mechanism may be that it does not act through a general feeling of rightness but through some specific emotion. We know that regulatory fit's effects are independent of mood (Cesario et al., 2004), but this does not mean they are independent of emotion. For example, we know that participants predict they will enjoy a task more under fit as opposed to non-fit as well as rate a task as having been more enjoyable (Freitas and Higgins, 2002). Enjoyment is a particular emotion that is not synonymous with mood. According to the feelings-as-information interpretation (Cesario et al., 2004; Clore, 1992; Clore et al., 2001), individuals would feel a sense of enjoyment and believe that the new product or community policy they are reading about is responsible for that feeling. The feeling of enjoyment is a potential candidate for an alternative mechanism.

Regulatory fit may affect whether or not someone enjoys a particular task, but it is an open question about whether this feeling of enjoyment is due to the emotion of enjoyment or another emotion such as greater interest, enthusiasm, alertness, or even a group of these

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APPENDIX A

EAGERNESS AND VIGILANT QUESTIONS

Please rate the extent to which you tried to be vigilant against accidentally marking unstudied words as "old" on a scale from 1-5 with 1 being not vigilant at all and 5 being extremely vigilant.

1 2 3 4 5

Please rate the extent to which you marked items as "old" even if you weren't sure in order to maximize your total score on a scale from 1-5 with 1 being I didn't do this at all and 5 being I did this a lot.

1 2 3 4 5

Feeling of Rightness Question 1

Sometimes people “feel right” about their goal pursuit when their thoughts and actions align. Please indicate how “right” you felt about your goal of doing well on the memory test on the scale below with 1 being I did not feel right at all and 5 being I felt extremely right.

1 2 3 4 5

Feeling of Rightness Question Version 2

Sometimes people “feel right” about their goal pursuit when their thoughts and actions align. You may have felt something like this before when you had a decision to make. Sometimes we

decide to do something and it feels very “right”, but other times our decisions might feel “wrong” like when we don’t see any good options in a situation. Please indicate how “right” you felt about your performance on the memory test with1 being I did not feel right at all and 5 being I felt extremely right.

APPENDIX B

FIGURES

Experiment 1

Figure 1. *Mean confidence in hits with standard error bars.*

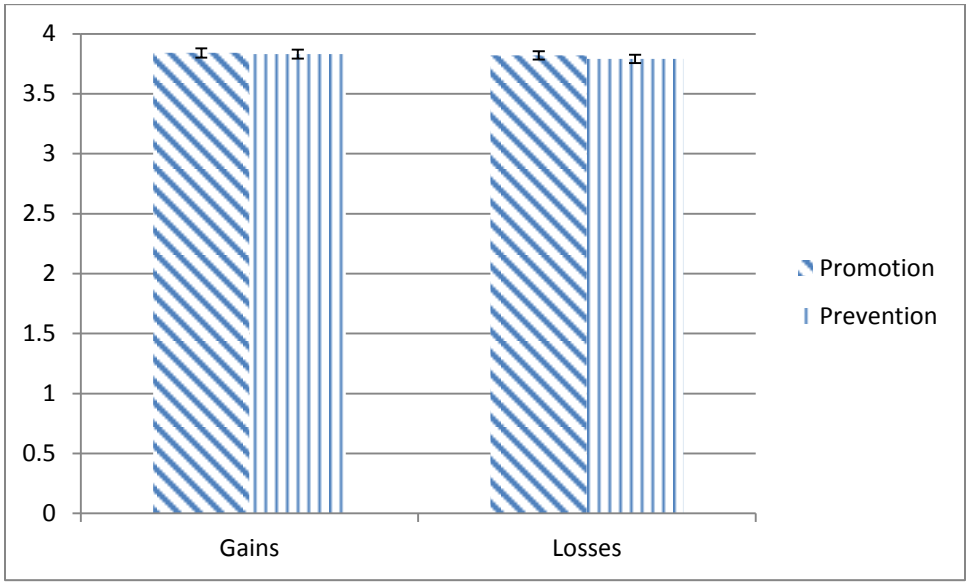


Figure 2. *Mean number of false alarms by reward structure with standard error bars*.

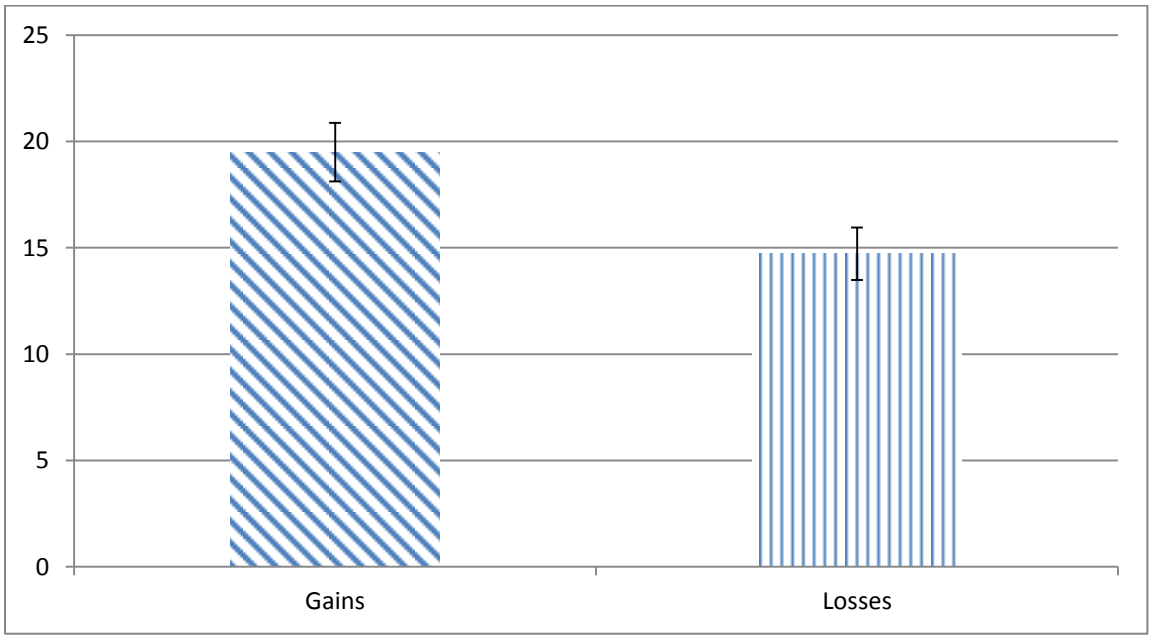
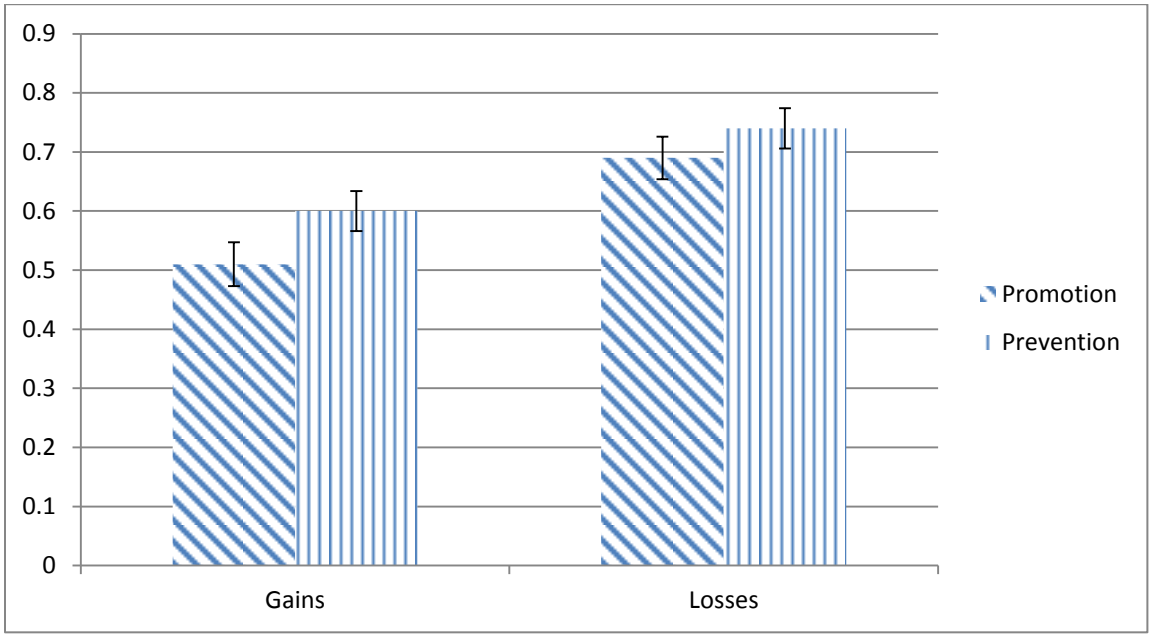


Figure 3. *Mean proportion of correct hits with standard error bars.*



Experiment 2

Figure 4. *Mean confidence ratings for hits with standard error bars.*

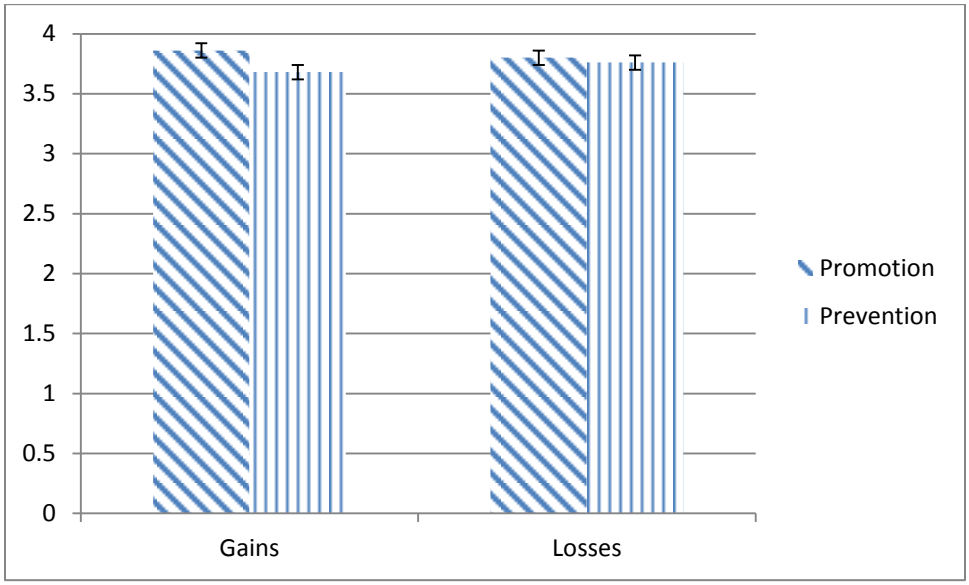


Figure 5. *Mean confidence ratings for critical lures with standard error bars.*

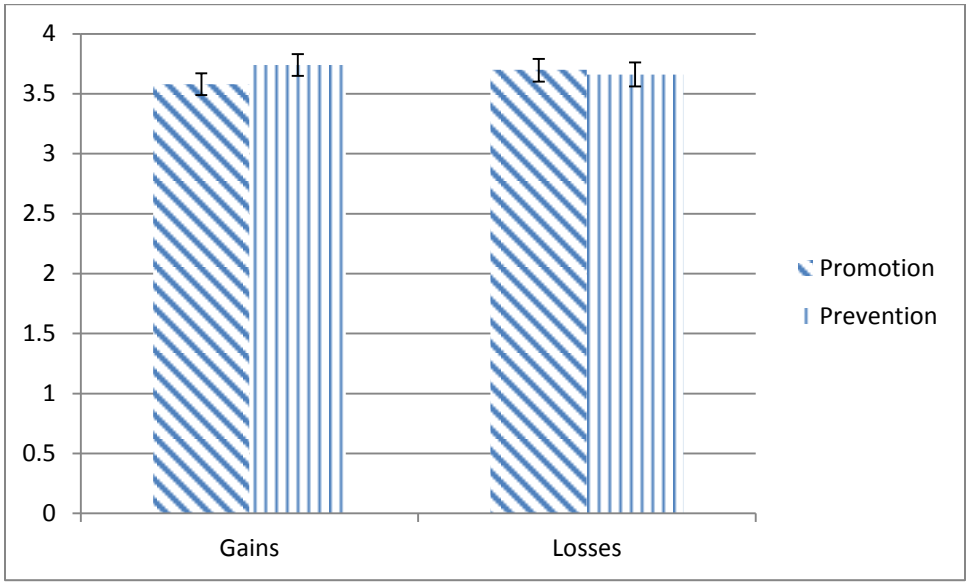
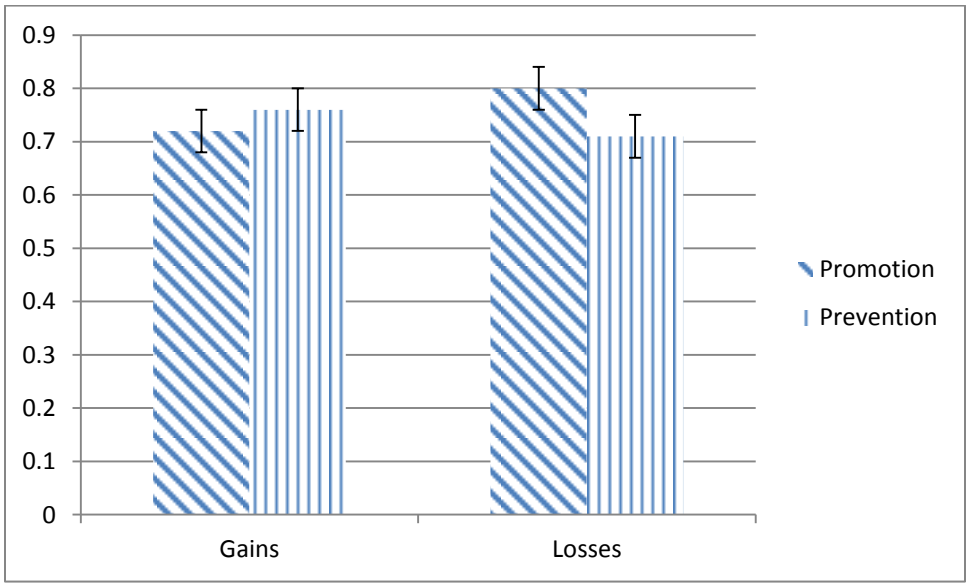


Figure 6. *Mean proportion of critical lures across conditions with standard error bars.*



Experiment 3

Figure 7. *Mean global predictions across condition with standard error bars.*

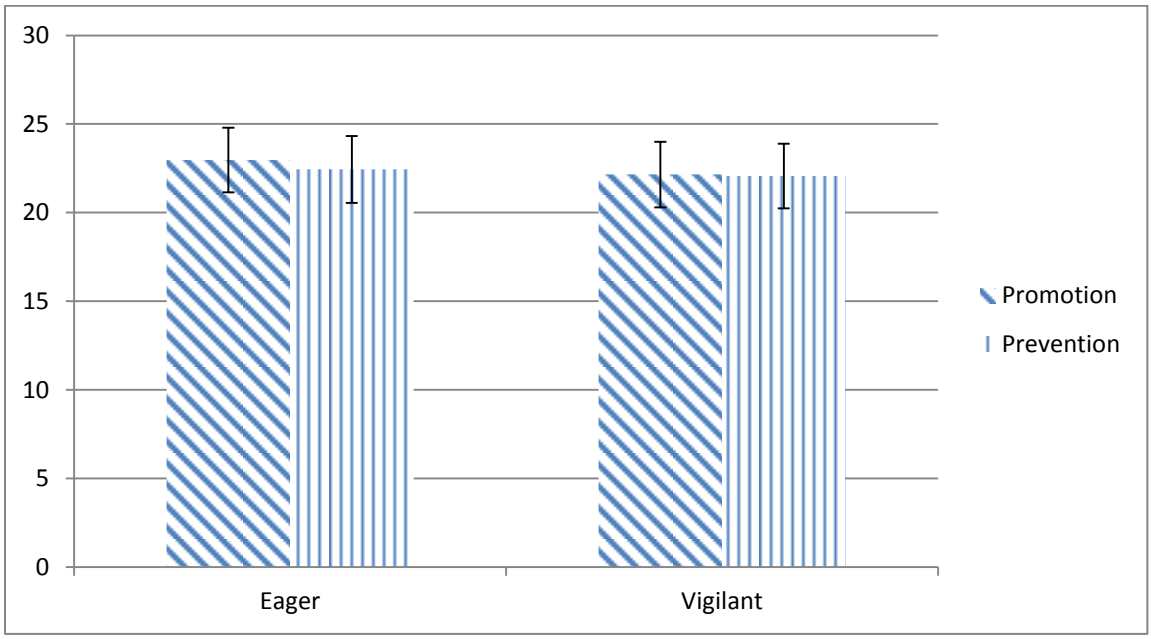


Figure 8. *Mean confidence in global predictions with standard error bars.*

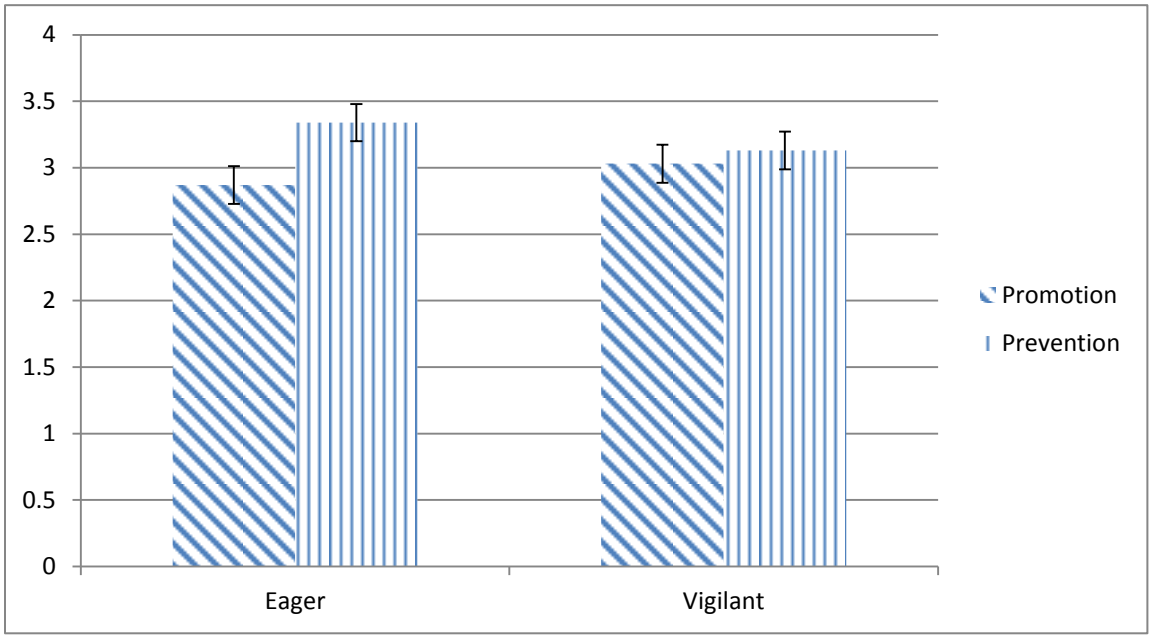


Figure 9. *Mean post-dictions with standard error bars.*

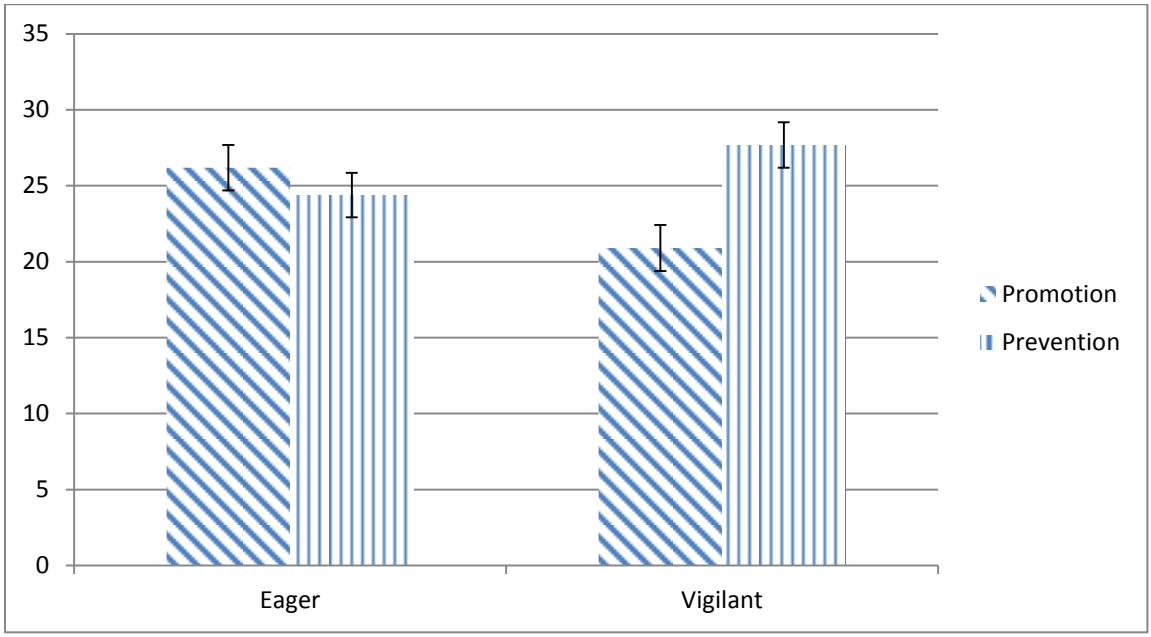


Figure 10. *Mean post-diction confidence with standard error bars.*

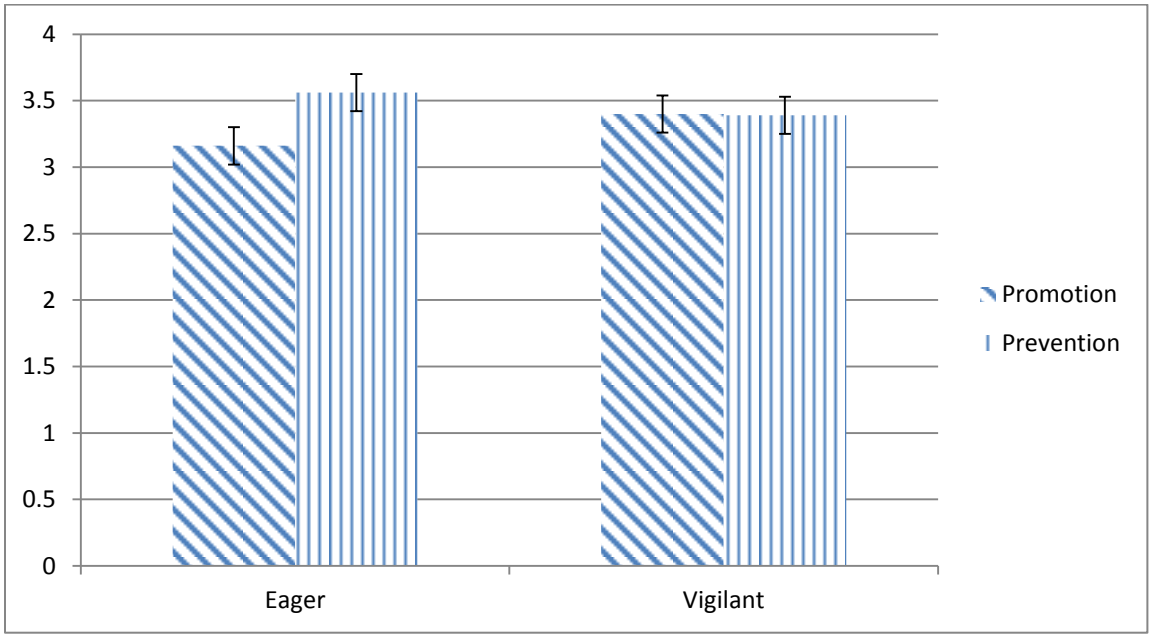
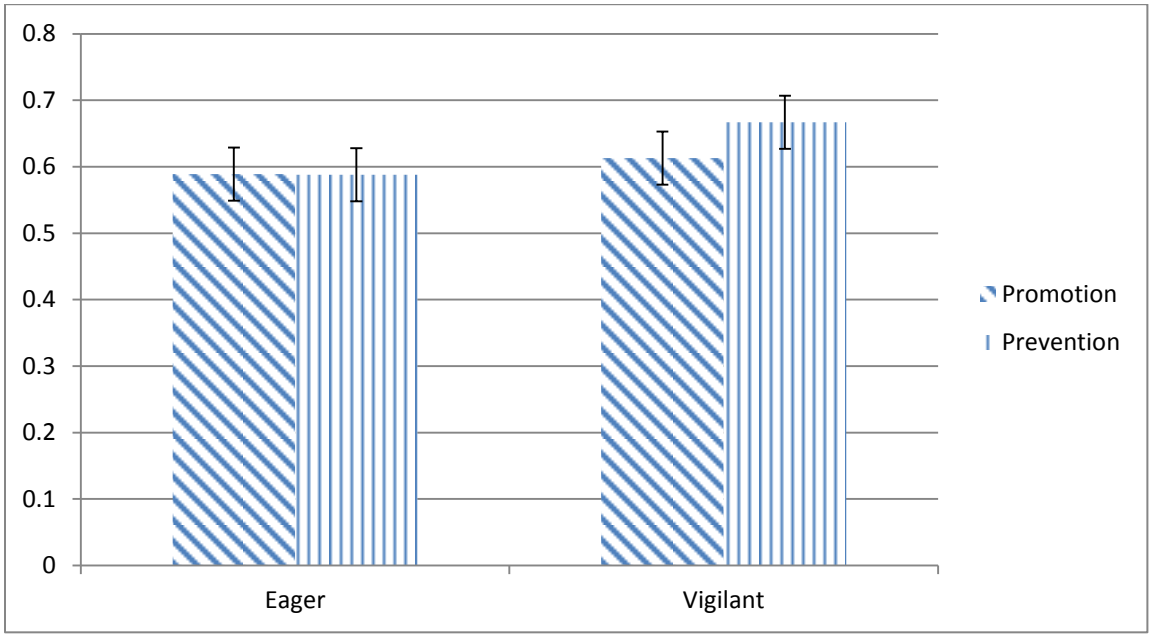


Figure 11. *Mean proportion corrected hits with standard error bars.*



Experiment 4

Figure 12. *Mean confidence in hits with standard error bars.*

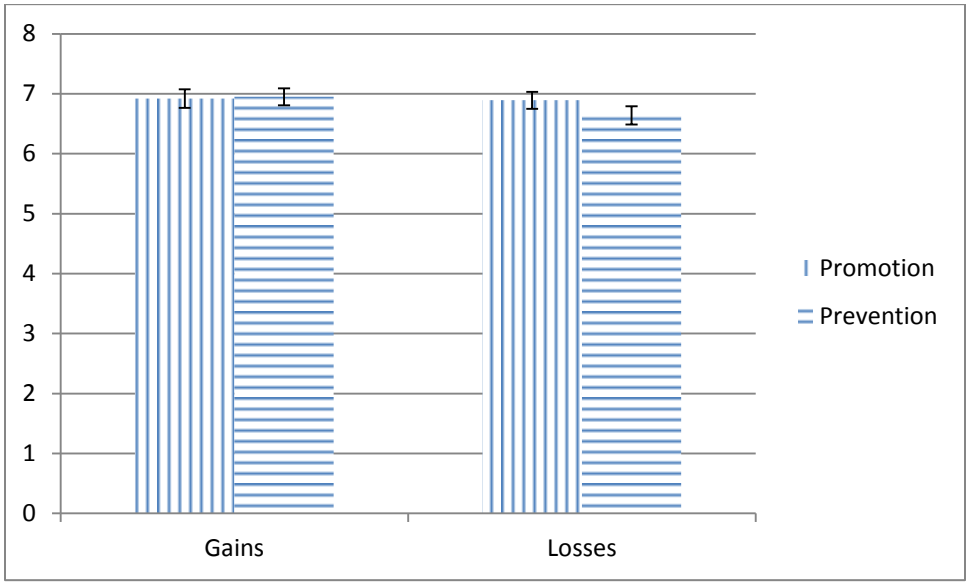


Figure 13. *Mean number of hits with standard error bars*.

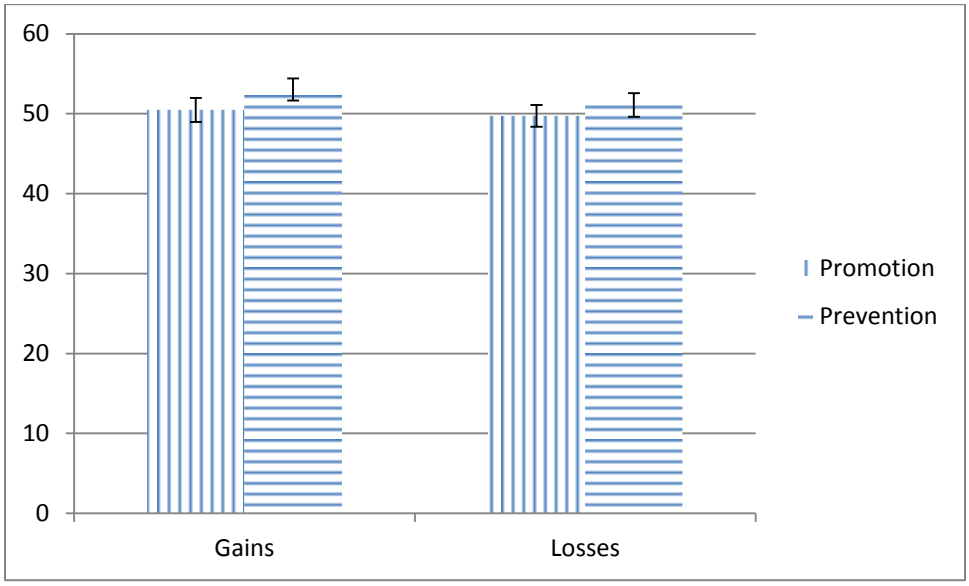


Figure 14. *Mean feeling of rightness responses with standard error bars.*